UNIVERSITATEA DE VEST DIN TIMIȘOARA

DOCTOR HONORIS CAUSA SCIENTIARUM

JEAN–PIERRE SAUVAGE

Laureat al Premiului Nobel pentru Chimie

Timișoara, 2023

Cuvânt
la deschiderea ceremoniei de acordare a titlului de
DOCTOR HONORIS CAUSA SCIENTIARUM
al Universității de Vest din Timișoara
domnului
JEAN–PIERRE SAUVAGE

Stimaţi membri ai comunităţii academice a Universităţii de Vest din Timişoara,
Distinşi oaspeţi,
Dragi colegi şi studenţi,
Onoraţi participanţi,
Stimate domnule Jean-Pierre Sauvage,

Lumea de astăzi este o lume în care tehnologia ne modelează viețile. Rareori ne gândim însă la modul în care tehnologia și știința au evoluat până la nivelul înalt din zilele noastre. Totuși, uneori ne uităm în urmă și descoperim că, pe drumul către o lume dominată de inteligența artificială, există un lung șir de oameni de știință ce doar visau la lucruri care au fost considerate înaintea vremii lor, un șir lung de oameni care au acceptat provocarea de a explora noi posibilităţi. Unii dintre acești oameni au devenit celebri, iar descoperirile lor fac parte din cărțile pe care le predăm astăzi, alții rămân necunoscuți și deschid doar porțile unor noi idei, care vor fi dezvoltate ulterior de alte minți deschise spre nou.

Luând în serios rolul pe care i l-au dat fondatorii săi, cel de principal centru al cunoașterii din vestul României, de promotor al culturii și principal susținător al societății, Universitatea de Vest din Timișoara, prin cele unsprezece facultăți ale sale, încearcă să ofere în mod constant recunoaștere unor astfel de persone, care și-au dedicat viața urmăririi viselor, pentru a crea o lume „ieșită din minți", din mințile lor! Astfel, aducem în lumina reflectoarelor modele valoroase pentru generațiile viitoare și reducem decalajul, pe care uneori îl percep oamenii, între mediul academic și comunitate. Este rolul universităților de a genera schimbări societale și de a promova valori autentice, prin popularizarea științei și prin apropierea oamenilor de știință și cultură. Noi suntem cei care avem datoria de a deschide mințile și de a oferi generațiilor următoare impulsul să viseze și să muncească din greu pentru visele lor.

Laureatul de astăzi, profesorul Jean-Pierre Sauvage, una dintre cele mai proeminente figuri din lumea chimiei, și laureat al Premiului Nobel pentru Chimie în 2016, a început ca oricare alt copil, în școli normale, jucându-se cu prietenii săi. Nevoit mereu să se mute și fiind mereu expus unor noi medii și oameni, el a luat tot ce este mai bun din fiecare experiență. Chimia era atunci doar o pasiune pentru experimentele grozave pe care le presupunea. Dar mințile curioase țintesc sus și se întreabă... dar dacă?

Astăzi, onorăm o persoană specială, o persoană care înțelege că marile rezultate în știință vin din muncă susținută, din respectarea propriului trecut și a tuturor celor care ți-au dat șansa de a te dezvolta. Lucrând cu profesorul Jean-Marie Lehn, pe care am avut șansa să-l vedem în aceeași aulă în urmă cu doar o lună și care ne-a onorat devenind membru al comunității noastre academice,

Jean-Pierre Sauvage a fost absorbit de lumea fascinantă a științei și de universul nelimitat al chimiei. L-a lăsat pe mentorul său să-i arate cum se pot dizolva limitele printr-o abordare corectă a muncii și a oamenilor cu care lucrezi și, de asemenea, prin abordarea corectă a întregii vieți. Au devenit prieteni și au lucrat împreună, deschizând noi domenii de cercetare.

Deschis la provocările lumii, domnul Sauvage a început să se intereseze de energiile durabile, un domeniu care începea să se contureze și, în 1977, împreună cu domnul Lehn și echipa lor, au publicat un studiu despre primele sisteme care conduceau la reducerea fotochimică a apei în H2. În 1980, și-a fondat propriul grup de cercetare (împreună cu doi doctoranzi foarte motivați, Pascal Marnot și Romain Ruppert). Mai târziu, li s-au alăturat și Jean-Paul Collin, Marc Beley și Christiane Dietrich-Buchecker. Munca lor în cataliză omogenă și fotochimie anorganică a condus la rezultate spectaculoase. S-au concentrat pe topologia chimică și pe mașini moleculare, dar și pe diverse alte domenii noi de cercetare.

Viața l-a purtat în contexte diferite, în echipe de cercetare diferite și prin multe universități și laboratoare de cercetare pentru că, deja, chimia era modul său de a trăi. În 2016, chimia supramoleculară îl conduce pe el și pe colegii săi Sir J. Fraser Stoddart și Bernard L. Feringa spre obținerea Premiului Nobel pentru Chimie, un fel de Sfânt Graal pentru orice cercetător. Totuși, își continuă aventura de descoperire și muncă asiduă, rămânând un exemplu de perseverență și deschidere către idei noi.

Alegerea de a-l invita să devină Doctor Honoris Causa al universității noastre a avut la bază, pe lângă cariera sa fabuloasă și un simbolism aparte, deoarece laureatul nostru s-a născut în același an cu UVT, un an în care Europa și lumea întreagă încercau să renască din cenușa celui de-al Doilea Război Mondial, iar speranța o constituia acordarea unui rol mult mai important în viața noastră educației și științei.

Considerăm că modelul oferit de profesorul Sauvage este foarte important pentru comunitatea noastră: munca asiduă, respectul pentru trecutul tău și pentru oamenii din viața ta, să nu renunți niciodată și să-ți împărtășești cunoștințele tinerei generații sunt cheile succesului.

Stimate Domnule Profesor Jean-Pierre Sauvage,

Prin titlul de Doctor Honoris Causa Scientiarum pe care vi-l oferă astăzi, Universitatea de Vest din Timișoara vă mulțumește pentru toată munca și dăruirea Domniei Voastre și pentru faptul că ați oferit tinerelor generații nu doar noi descoperiri, ci și modelul unui om desăvârșit și respectabil. Suntem onorați de prezența dumneavoastră la Timișoara și de acceptul de a deveni membru al comunității noastre academice. Vă dorim sănătate și puterea de a vă continua munca, cu aceeași pasiune și dăruire!

Prof. univ. dr. Marilen-Gabriel Pirtea

Rectorul Universității de Vest din Timișoara

Opening Address
for the ceremony of awarding the title of
DOCTOR HONORIS CAUSA SCIENTIARUM
of the West University of Timișoara
to Mr. Jean – Pierre Sauvage

Esteemed members of the academic community of the West University of Timișoara,
Distinguished guests,
Dear colleagues and students,
Honoured participants,
Esteemed Professor Jean-Pierre Sauvage,

The world of today is a world in which technology is shaping our lives. Rarely do we think of how technology and science evolved to the high levels of today. Still, sometimes we look back and discover that on the way to a world dominated by artificial intelligence, there is a long line of scientists that were just dreaming about things that were considered ahead of their times, a long line of people that took the challenge of exploring new possibilities. Some of them became famous and their discoveries are part of the books that we teach today, others remain unknown and just open the doors to new ideas to be developed later by other inquisitive minds.

Taking seriously the role it was given by its founders, that of the main centre of knowledge in the western part of Romania, of a promoter of culture and a main supporter of the society, the West University of Timișoara, through its eleven faculties, tries to constantly offer recognition to such persons that dedicated their lives to pursuing their dreams, to create a world out of its mind, out of their minds! This way, we bring into the spotlight valuable models for future generations and reduce the gap that sometimes people perceive, between academia and the community. It is the role of universities to generate societal change and to promote authentic values, by popularizing science and by bringing people closer to science and culture. We are the ones that have the duty of opening minds and giving the next generations the impulse to dream and work hard for their dreams.

The laureate of today, Professor Jean-Pierre Sauvage, one of the most prominent figures in the world of chemistry, and winner of the Nobel Prize for Chemistry in 2016, started as any other kid, in normal schools, playing with his friends. Having to constantly move around and constantly being exposed to new environments and people, he took the best of each experience. Chemistry was then just a passion for doing cool experiments. But inquisitive minds dream high and wonder… what if?

Today, we are honouring a special person, a person that understands that great results in science come from hard work, from respecting your past and all of those that have given you the chance to develop yourself. Working with Professor Jean Marie Lehn, whom we had the chance to see in this very same aula just a month ago, and who honoured us by becoming a member of our academic community, Jean-Pierre

Sauvage got absorbed by the fascinating world of science and by the unlimited universe of chemistry. He let his mentor show him how limits can dissolve with the right approach to work and the people that you work with and also to life itself. They became friends and worked together, opening new fields of research.

Open to the world's challenges, Mr Sauvage started to take an interest in sustainable energies, a field that was starting to shape up and, in 1977, along with Mr Lehn and their team, they published one of the very first systems leading to photochemical water reduction to H2. In 1980, he founded his own research group (with two highly motivated PhD students, Pascal Marnot and Romain Ruppert). Later, Jean-Paul Collin, Marc Beley, and Christiane Dietrich-Buchecker, also joined. Their work in homogeneous catalysis and inorganic photochemistry led to spectacular results. They became focused on chemical topology and molecular machines, but also in various relatively remote fields.

Life took him in different contexts, different teams of research and different universities and research labs because chemistry was already his way of living. In 2016, supramolecular chemistry leads him and his colleagues Sir J. Fraser Stoddart and Bernard L. Feringa towing the Nobel Prize in Chemistry, sort of a Holy Grail for any researcher. Still, he continues his adventure of discovery and hard work, remaining an example of perseverance and openness to new ideas.

The choice of inviting him to become a Doctor Honoris Causa of our university, besides his fabulous career had somehow a symbolic ring to it as he was born in the same year as our university, a year when Europe and the world were trying to raise from the ashes of the Second World War and hope was so much related to giving education and science an important role in our lives.

We consider that the model offered by Professor Sauvage is very important for our community: hard work, respect for your past and for the people in your life, never giving up and sharing your knowledge with the young generation are keys to success.

Esteemed Professor Jean Pierre Sauvage,

Through the title of Doctor Honoris Causa Scientiarum offered to you today, the West University of Timișoara thanks you for all your hard work and dedication and for providing the younger generations not only with new discoveries but also with the model of an accomplished and respectable human. We are honoured by your presence in Timișoara and by your acceptance to become a member of our academic community. We wish you health and the strength to continue your work with the same passion and dedication!

Univ. Prof. Dr. Marilen-Gabriel Pirtea

Rector of the West University of Timișoara

LAUDATIO
în onoarea
domnului JEAN–PIERRE SAUVAGE
cu ocazia acordării titlului de
DOCTOR HONORIS CAUSA SCIENTIARUM
al Universității de Vest din Timișoara

„Esența chimiei nu este doar de a descoperi, ci de a inventa și, mai presus de toate, de a crea."

(J.-M. Lehn)

Universitatea de Vest din Timișoara a decis să acorde titlul de *Doctor Honoris Causa* domnului profesor Jean-Pierre Sauvage. Pentru universitatea noastră este atât un privilegiu, cât și o onoare că dumneavoastră, domnule profesor Sauvage, ați acceptat acest titlu și ați devenit membru al comunității noastre academice.

După cum știm cu toții, România este cunoscută în lume și pentru gimnastele sale: menirea lor este de a desăvârși abilitățile muritorilor de rând, adăugându-le mișcări precise și pline de grație. Tu, Jean-Pierre, vei rămâne în Istoria – cu I mare – Științei drept primul savant care a învățat moleculele artificiale să se miște. Le-ai făcut să se deplaseze cu o precizie și o perfecțiune la care, acum câțiva ani, nu puteam decât să visăm. Așa cum mașinile moleculare naturale lucrează în armonie deplină ca să permită mușchilor gimnastei să-i miște întregul corp, și mașinile moleculare pe care le-ai creat au început să fie folosite de alți chimiști pentru a deplasa obiecte macroscopice și a valorifica noi proprietăți ale materiei. Toate acestea, datorită faptului că le-ai descoperit principiile de bază. Ne-ai deschis cu adevărat ochii la chimia viitorului.

Putem, așadar, să spunem că ai adăugat o nouă dimensiune moleculelor create de om. Le-ai făcut să se miște așa cum vrei tu. Dar, înainte de a le face să se miște, le-ai… făcut. În efortul tău crucial, ai pus în aplicare, cât se poate de ingenios, principiile recunoașterii moleculare, astfel încât să aranjezi cu precizie blocuri de construcție moleculare. Odată blocurile aranjate corespunzător în spațiu unul față de altul, ai utilizat reacții chimice speciale pentru a le fixa, reușind ceea ce nu a mai reușit nimeni până atunci: să interconectezi mecanic două sau mai multe molecule separate. Dacă una dintre ele are mai multe stații, tu ai găsit modalitatea de a deplasa, treptat, o porțiune a ei de la o stație la alta. Astfel, pentru prima dată, chimia din eprubetă a devenit dinamică!

Domeniul pe care l-ai pus în lumină, al moleculelor interconectate, a ajuns acum la maturitate. Nu sunt puțini cei care susțin că controlul mișcării moleculare ca reacție la stimuli chimici sau fizici reprezintă nivelul cel mai înalt al controlului asupra materiei: acest lucru este amplu demonstrat de numeroasele exemple oferite de cei care îți calcă pe urme, deci ai deschis calea unor noi direcții de cercetare în chimie, fizică și știința materialelor. Ai pus bazele dezvoltării unor mașini moleculare din ce în ce mai complexe, inclusiv comutatoare, motoare și pompe moleculare. Unii chiar au folosit motoarele moleculare pentru a obține mișcare la scară macroscopică.

Nimeni nu ar fi surprins dacă cercetarea ta ar conduce la crearea unor tipuri noi de materiale, ca polimeri care se repară singuri și materiale inteligente capabile să reacționeze la schimbările din mediu. Ai inspirat noi abordări de eliberare a medicamentelor și de detectare moleculară în organism, care ar putea avea implicații importante în domeniul asistenței medicale și al cercetării biomedicale.

Cine îl cunoaște pe Jean-Pierre știe foarte bine că lucrul pe care îl prețuiește cel mai mult este satisfacția pe care o citește pe chipul colegilor săi, când reușesc să obțină în eprubetă ceea ce își imaginează el în mintea sa prolifică. Indiferent de recunoașterea venită din partea colegilor săi – Premiul Nobel pentru chimie, acordat lui în 2016, fiind cea mai importantă distincție care i s-a oferit – bucuria de a vedea sintetizată molecula pe care și-a imaginat-o este, în ochii săi, răsplata supremă. Personalitatea lui solară e cea care luminează premiile pe care le primește, și nu premiile îi schimbă personalitatea: „Excelența ca stare firească” este semnul său distinctiv!

Astăzi sărbătorim știința, sărbătorim chimia, sărbătorim excelența în chimie și știință. Mai presus de toate, sărbătorim personalitatea unică a lui Jean-Pierre Sauvage. Făcând acest lucru, ar trebui să sărbătorim începuturile sale în domeniul științei, în renumita școală de chimie din Strasbourg, în marea familie de chimiști din Strasbourg, din care Jean-Pierre Sauvage a făcut parte ca student, doar pentru a deveni, mai târziu, unul dintre cei mai proeminenți membri ai săi. Chimiștii care ne-au schimbat modul de înțelegere a acestei frumoase științe – ca Guy Ourisson, Jean-Marie Lehn, conducătorul tezei sale de doctorat și prietenul său apropiat – au transformat, împreună cu Jean-Pierre, orașul Strasbourg într-unul din centrele de cercetare chimică de elită din lume.

O anume trăsătură îl deosebește pe Jean-Pierre de alți laureați ai Premiului Nobel. Când primești premiul, trebuie să-ți faci autobiografia. Ilustrând personalitatea sa cu adevărat generoasă, autobiografia lui Jean-Pierre vorbește mai mult despre oamenii care contează în viața lui decât despre el însuși! Citind-o printre rânduri, Jean-Pierre, iese la lumină înclinația ta naturală de a dărui mai mult decât primești. Știm cu toții cât de acerbă este concurența din lumea științei, dar tu ai reușit să ți-i faci prieteni chiar și pe cei mai înverșunați concurenți ai tăi și, împreună cu ei, să lucrezi pentru progresul științei. Eu, ca mulți alții, m-am bucurat de generozitatea ta autentică în circumstanțe prea sentimentale ca să le descriu în fața unui public atât de distins.

Jean-Pierre Sauvage s-a născut în 21 octombrie 1944, la Paris, într-o familie cu origini în Normandia. De la bun început, copilăria lui a fost marcată de... mișcare. La trei ani, s-a mutat în Tunisia, iar mai târziu, în Algeria. A început școala în Tunisia și a continuat-o în SUA, la Saint-Louis și Denver, pe urmă... înapoi în Franța. Până la 10 ani, a schimbat alte cinci școli din vestul Franței, ajungând apoi în Lorena, iar, în cele din urmă, în Alsacia, care avea să devină casa lui. Și-a încheiat studiile de chimie la Strasbourg, în 1967, iar în același an și-a început doctoratul, sub îndrumarea profesorului Jean-Marie Lehn. Jean-Pierre Sauvage și marele nostru prieten Bernard Dietrich sunt cei care au sintetizat primii compuși macrobiciclici capabili să încapsuleze diferiți ioni, inclusiv alcalini și cationi de metale alcalino-pământoase (criptanzi și criptați pentru compușii nemetalici și, respectiv, complexele lor), molecule onorate cu Premiul Nobel, acordat, în 1987, lui Jean-Marie Lehn. După teza de doctorat, Jean-Pierre Sauvage a plecat la Oxford, în grupul de cercetare al lui Malcolm L. H. Green, un student strălucit al profesorului Geoffrey Wilkinson (laureat al Premiului Nobel pentru chimie în 1973, alături de profesorul Ernst Otto Fischer). S-a întors la Strasbourg, unde și-a înființat propriul grupul de cercetare, de mare succes.

Jean-Pierre Sauvage este cunoscut nu numai pentru munca sa, pentru care a primit Premiul Nobel. De exemplu, împreună cu Jean-Marie Lehn, a inițiat, în timpul crizei petrolului din 1973, un proiect care urmărea obținerea hidrogenului din apă și energie solară. Utilizând compuși de ruteniu și rodiu, el a făcut progrese majore în acest domeniu.

Când se întâmplă să fiu în aceeași cameră cu Jean-Pierre, simțim amândoi nevoia să aducem un omagiu dragii noastre colege Christiane Dietrich-Buchecker, un om minunat și un mare chimist, a cărei contribuție la producția științifică a grupului de cercetare al lui Jean-Pierre s-a dovedit a fi hotărâtoare. Domeniul „topologiei chimice”, al moleculelor interconectate, îi datorează cele mai călduroase mulțumiri! Mulțumindu-i lui Jean-Pierre că ne-a deschis ochii la știința pe care a dezvoltat-o, trebuie să-i mulțumim cu toții și lui Carmen, soția sa cu o personalitate strălucitoare. Prezența ei constantă alături de el a fost o adevărată inspirație pentru el, ea fiind o sursă constantă de energie pentru toți cei care o cunosc.

Mai sunt foarte multe de spus despre chimia lui Jean-Pierre, despre personalitatea sa și despre ceea ce continuă să dea comunității științifice. Cu toate acestea, îi voi imita mentalitatea, ilustrând ideea sa generoasă, a unei comunități științifice vibrante, prin aceste trei fotografii, făcute la mai bine de 30 de ani una de alta: prima este în comunitatea de chimiști din Strasbourg, sărbătorind, în 1988, Premiul Nobel primit de Jean-Marie Lehn. A doua este de la sărbătorirea propriului Premiu Nobel. Și, în sfârșit, în a treia, îi sărbătorește pe cei ce ne-au fost apropiați și nu mai sunt printre noi, dar ne-au făcut ceea ce suntem astăzi.

Dragă Jean-Pierre, datorită ție, astăzi sărbătorim Chimia, sărbătorim Știința, sărbătorim Timișoara și Cultura ei, sărbătorim o Europă unită și, cel mai important, așteptăm cu nerăbdare împlinirea destinului nostru comun! Vă mulțumesc, domnule profesor Sauvage!

Quod bonum, felix faustumque sit!

COMISIA DE EVALUARE ȘI DE ELABORARE A LAUDATIO

Preşedinte:
Prof. univ. dr. Marilen-Gabriel PIRTEA, *Rectorul Universităţii de Vest din Timişoara*

Membri:

Prof. univ. dr. Anton Trăilescu, *Preşedintele Senatului Universităţii de Vest din Timişoara*
E.S. Ambasador Laurence Auer, *Ambasada Franței în România*
Academician Prof. univ. dr. DHC Marius Andruh, *Membru corespondent al Academiei Române*
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Prof. univ. dr. ing. Adrian Curaj, *Director al Unității Executive pentru Finanțarea Învățământului Superior, a Cercetării Dezvoltării şi Inovării*
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Prof. univ. dr. ing. Mihai Putz, *Universitatea de Vest din Timişoara*
Dr. Daniel Funeriu, *Universitatea din Bucureşti*

LAUDATIO

in honour of

Mr. JEAN–PIERRE SAUVAGE

on the occasion of conferring on him the title of

DOCTOR HONORIS CAUSA SCIENTIARUM

of the West University of Timișoara

"The essence of chemistry is not only to discover but to invent, and, above all, to create."

(J.-M. Lehn)

The West University of Timișoara decided to award the title of *Doctor Honoris Causa* to Professor Jean-Pierre Sauvage. For our university it is both a privilege and an honour that you, Professor Sauvage, accepted this title and now became a member of our academic community.

Romania is known across the world also for its famous gymnasts: their trade is to extend the common mortal's capacities to the precise, purposeful, and graceful movement. You, Jean-Pierre, will remain in the History of science -with a capital H- as the first scientist that trained the man-made molecules to move. You made them move with a level of precision and perfection that, a few years ago, we could only dream about. Just as natural molecular machines work in an absolute harmony to allow the gymnast's muscles to move their whole body, the molecular machines that you created have started to be used by other chemists to move macroscopic objects and access new properties of matter. All this, thanks to your discovery of their basic principles. You truly opened our eyes on the chemistry of tomorrow.

Thus, we can truly say that you added a new dimension to man-made molecules. You made them move in a way that you can decide. But before making them move, you… made them. In this crucial endeavour, you imaginatively used the principles of molecular recognition so as to precisely pre-arrange molecular building blocks. Once suitably arranged in space with respect to one another, you used special chemical reactions to lock them in place and succeed in what no-one before you succeeded: to mechanically interlock two or more separate molecules. If one of the molecules has several stations, you succeeded to find ways to move one molecular part, stepwise, from a station to another. So, for the first time, chemistry in the test-tube became dynamic!

The entire field that you unravelled -the field of interlocked molecules- is now at maturity and many argue that controlling the movement at the molecular level in response to chemical or physical stimuli, is the ultimate level of control that one can have over matter: this is amply

demonstrated by the many examples provided by those who have followed in your footsteps, so you opened up new avenues for research in chemistry, physics, and materials science. You laid the foundation for the development of ever more sophisticated molecular machines, including molecular switches, motors, and pumps. Some even used molecular motors to obtain movement at macroscopic scale.

No one would be surprised if your research led to the development of new types of materials, such as self-healing polymers and smart materials that can respond to changes in their environment. You inspired new approaches to drug delivery and molecular sensing, which could have important implications for healthcare and biomedical research.

All those who know Jean-Pierre are well aware that the prize he cherishes most is the satisfaction that he reads on the face of his co-workers who manage to obtain in the test-tube the molecules he imagines in his prolific mind. Whatever external recognition his peers would bestow on him, the Nobel Prize in Chemistry in 2016 being the most prominent one, the joy of seeing synthesised the molecule that he imagined would be, to his eyes, the ultimate reward. It is his solar personality that enlighten the prizes that he receives and not the prizes that change anything to his personality: “Excellence as a matter of fact” is his what his trademark is!

Today we celebrate science, we celebrate chemistry, we celebrate the excellence in chemistry and science. Above all, however, we celebrate the unique personality of Jean-Pierre Sauvage. While we do this, we should celebrate his beginning in science in the great scientific school of chemistry of Strasbourg, the great family of chemistry from Strasbourg, in which Jean-Pierre Sauvage participated, as a student, only to later become as one of its most prominent members. Chemists that changed our understanding of this beautiful science - such as Guy Ourisson, his thesis supervisor and close friend, Jean-Marie Lehn - together with Jean-Pierre, established Strasbourg as one of the top chemistry research areas in the world.

Among the Nobel laureates there is a trait that distinguishes Jean-Pierre from other laureates. When you receive the prize, you must write your autobiography. Illustrating his genuinely generous personality, Jean-Pierre’s autobiography is more about the people that matter in his life than about himself! Reading between the lines of your autobiography, Jean-Pierre, one can feel your natural tendency of giving to others more than you receive from them. We all know how ruthless competition is in the scientific world, but somehow you even managed to make your most fierce competitors your friends and, together, work for the advancement of science. I, among others, could feel first-hand this genuine generosity in circumstances that are too emotional for me to be able to express them in front of such a distinguished public.

Jean-Pierre Sauvage was born on October 21, 1944 in Paris, in a family with origins from Normandy. His childhood was already marked by… movement. At three he moved to Tunisia and later Algeria. He started school in Tunisia and then in the USA: Saint-Louis, Denver and… back to France. Until the age of 10 he changed another five different schools in the west of France, and then he went to Lorraine and, finally, to Alsace, which was to become his home. He finalized his chemistry studies in Strasbourg, in 1967, and started, the same year, his PhD thesis under the guidance of Professor Jean-Marie Lehn. Jean-Pierre Sauvage, together with our great friend

Bernard Dietrich, are the ones that synthesised the first macrobicyclic compounds able to encapsulate various ions, including alkali and alkaline earth metal cations (cryptands and cryptates for the metal-free compounds and their complexes respectively), molecules that were honoured by the award in 1987 of the Nobel Prize to Jean-Marie Lehn. After the PhD thesis, he went to Oxford in the research group of Malcolm L. H. Green, a brilliant student of Professor Geoffrey Wilkinson (1973 Nobel Laureate in Chemistry with Professor Ernst Otto Fischer). He returned to Strasbourg where he founded his very successful research group.

Jean-Pierre Sauvage is known not only for the work that led to the Nobel Prize. Together with Jean-Marie Lehn he initiated during the oil crisis of 1973 a project aimed at obtaining hydrogen from water and solar energy. By using ruthenium and rhodium compounds he made significant advances in the field.

When I happen to be in the same room as Jean-Pierre, we instinctively feel the need to pay homage to our dearest colleague Christiane Dietrich-Buchecker, a wonderful person and a great organic chemist whose contribution to the scientific production of his research group turned out to be determinant. The field of "Chemical Topology" -the field of interlocked molecules- owes her the warmest THANK YOU! While thanking Jean-Pierre for opening our eyes to the science he developed, we all must thank the shining personality of Carmen, Jean-Pierre's wife. Her constant presence by his side was as much an inspirational figure for him as she is a constant source of energy for all of us meeting her.

There is so much more to say about Jean-Pierre's chemistry, his personality and what he continues to give to the scientific community. I shall, however, emulate his mentality, and illustrate his generous idea of a vibrant scientific community through these three pictures, separated by more than 30 years: the first is within the chemical community of Strasbourg, celebrating in 1988 Jean-Marie Lehn's Nobel Prize. The second is celebrating his own Nobel Prize. And, finally, the third, is celebrating those close to us that are not among us anymore, but all made us what we are today.

Dear Jean-Pierre, thanks to you, today we celebrate Chemistry, we celebrate Science, we celebrate Timișoara and its Culture, we celebrate a united Europe and, most importantly, we are looking forward to our common destiny! Thank you, Professor Sauvage!

Quod bonum felix faustumque sit!

ACCEPTANCE SPEECH
of Mr. JEAN–PIERRE SAUVAGE
on the occasion of the awarding of the honorary title of
DOCTOR HONORIS CAUSA SCIENTIARUM
of the University of the West in Timișoara

First of all, I would like to warmly thank the University of Timișoara and its president, Professor Marilen Gabriel Pirtea, for awarding me the title of Doctor Honoris Causa Scientiarum. It is indeed a great honor that makes me happy, proud and grateful. Although I have met Romanian scientists many times at international meetings, I must confess that I have never had Romanian scientists working in my laboratory, which I regret. However, I met Professor Daniel Funeriu many years ago and we quickly established close scientific ties and became friends. More than that, I met his father more than 35 years ago, when Daniel was still a teenager with a passion for chemistry, and we were able to arrange for Daniel to obtain chemistry books that were difficult to get in Central Europe at that time. Let me tell my research team members that it was wonderful to be able to help a young man who was destined to become a scientist one day and who did wonderful work many years later.

I am particularly happy that your University created its Faculty of Chemistry, Biology and Geography in 1991, so quickly after the events of 1989. More generally, the promotion of science is the best way to fight against obscurantism. Under the effect of a great number of factors, our time is the scene of a strong and dangerous criticism of science. Various factors can be invoked to explain this dangerous tendency, among which conspiracy, ignorance and intellectual laziness. It is therefore essential that individuals and organizations like the Western University of Timișoara are active and demonstrate that anti-science actions are dangerous. Among the various scientific subjects essential for progress, chemistry, as a science or as an economic activity, is perhaps even more incriminated. This is particularly unfair when one considers the importance of chemistry as a science, but also the importance of the industry related to chemistry. Molecular sciences are of paramount importance in many fields of application, including biology, materials or medicine.

One of the most important areas of molecular sciences is "synthesis". Chemists are now able to make molecules of truly impressive complexity that can find important applications, especially in medicine, or that show promise for future applications. Our research team has been working mainly in the field of synthesis. At an early stage, we were able to fabricate complex molecular systems such as interlocking ring systems (called "catenanes"). Such species are found in nature (biology) and it was challenging to also make "catenanes" in a chemistry laboratory. Quickly, the research of my group evolved towards "molecular machines and motors", which also exist in nature. This field of machines and motors based on synthetic molecules has rapidly developed to a high level of sophistication with the preparation of various linear or rotary motors, muscles, compressors, pumps, etc. The objects made and studied by chemists are of course nano-objects, i.e. very tiny species.

I would like to conclude by saying that molecular chemists create new objects that can sometimes be considered as works of art. Most of them did not exist before they were made by experimentalists specialized in chemical synthesis. This specificity gives the chemist a particular role, even a unique power. The synthesis of these complex molecules, such as molecular motors, requires a high level of expertise and skill. It is obviously the result of a teamwork, involving professional researchers or professors, post-docs and PhD students. As far as my group is concerned, I would like to emphasize that their role was decisive. I thank them from the bottom of my heart for their essential contribution to the success of our research laboratory. I also thank you for having honored me with this short speech and, again, for conferring on me the title of Doctor Honoris Causa Scientiarum..

Jean-Pierre Sauvage

DISCURS DE ACCEPTARE
al domnului JEAN–MARIE LEHN
cu ocazia decernării titlului onorific de
DOCTOR HONORIS CAUSA SCIENTIARUM
al Universității de Vest din Timișoara

Înainte de toate, doresc să mulțumesc călduros Universității de Vest din Timişoara și rectorului acesteia, domnul profesor Marilen Gabriel Pirtea, pentru onoarea de a-mi conferi titlul de *Doctor Honoris Causa Scientiarum*. Este, într-adevăr, un titlu care mă face fericit, mândru și recunoscător.

Am întâlnit numeroși oameni de știință români la întruniri internaționale, dar trebuie să mărturisesc că niciun savant român nu a lucrat în laboratoarele mele, lucru pe care îl regret. Cu mulți ani în urmă, l-am cunoscut însă pe profesorul Daniel Funeriu, cu care am stabilit relații profesionale strânse și cu care m-am împrietenit repede. Mai mult, l-am cunoscut și pe tatăl său, acum mai bine de 35 de ani, când Daniel era încă un adolescent pasionat de chimie, și am reușit să-i procurăm manuale greu de găsit în Europa Centrală la acea vreme. Permiteți-mi să le spun membrilor echipei mele de cercetare că a fost minunat să pot ajuta un tânăr care era menit să ajungă om de știință și să facă lucruri extraordinare peste mai mulți ani.

Sunt deosebit de bucuros că universitatea dumneavoastră a înființat Facultatea de Chimie, Biologie și Geografie în 1991, atât de curând după evenimentele din 1989. În general, promovarea științei este cea mai eficientă metodă de luptă împotriva obscurantismului. Sub influența unui mare număr de elemente, vremurile în care trăim au devenit scena unor opinii critice vehemente și periculoase exprimate la adresa științei. Diverși factori pot fi invocați pentru a justifica tendința aceasta primejdioasă, printre care se numără conspirația, ignoranța și lâncezeala intelectuală. Este, așadar, esențial, ca oamenii și organizațiile precum Universitatea de Vest din Timișoara să fie active și să demonstreze că acțiunile îndreptate împotriva științei sunt periculoase.

Dintre diversele discipline științifice fundamentale pentru progres, chimia, ca știință sau ca activitate economică, este, poate, cea mai incriminată. Acest lucru este foarte nedrept, mai ales dacă ne gândim nu doar la însemnătatea ei ca știință, ci și la importanța industriei legate de ea. Științele moleculare ocupă un loc esențial în numeroase domenii aplicative, ca biologia, obținerea de noi materiale sau medicina.

Unul dintre domeniile fundamentale ale științelor moleculare este „sinteza”. Astăzi, chimiștii sunt capabili să obțină molecule de o complexitate cu adevărat impresionantă, care fie și-au găsit deja aplicații importante, fie au potențial pentru aplicații la fel de valoroase. Echipa noastră de cercetare lucrează în special în domeniul sintezei. Într-un stadiu incipient, am reușit să producem sisteme moleculare complexe, precum „catenanii” — structuri de macrocicluri interconectate. Asemenea structuri se regăsesc în natură (în biologie) și a fost o provocare să obținem „catenani” într-un laborator de chimie. Munca de cercetare depusă de echipa mea a evoluat rapid în direcția „mașinilor și motoarelor moleculare”, care există, și ele, în natură. Domeniul mașinilor și

motoarelor bazate pe molecule sintetice a atins rapid un înalt nivel de complexitate, odată cu obținerea de diverse motoare, mușchi artificiali, compresoare, pompe liniare sau rotative. Obiectele realizate și studiate de chimiști sunt, desigur, nanoobiecte, cu alte cuvinte, măsoară câțiva nanometri.

Aș dori să închei afirmând că chimiștii moleculari creează obiecte noi, care pot fi considerate uneori adevărate opere de artă. Majoritatea lor nici nu au existat înainte de a fi obținute de specialiștii în experimente de sinteză chimică. Natura lor specifică îi conferă chimistului un rol deosebit, chiar o putere unică. Sinteza acestor molecule complexe, cum ar fi motoarele moleculare, necesită un nivel ridicat de cunoștințe și îndemânare. Este, evident, rezultatul muncii în echipă, care implică profesori sau cercetători, postdoctoranzi și doctoranzi. În ceea ce îi privește pe membrii grupul meu, vreau să subliniez că au jucat un rol decisiv. Le mulțumesc din suflet pentru contribuția lor esențială la succesul laboratorului nostru de cercetare.

Vă mulțumesc și dumneavoastră că m-ați onorat ascultând acest scurt discurs și, încă o dată, că mi-ați conferit titlul de *Doctor Honoris Causa Scientiarum*.

Jean-Pierre Sauvage

Jean-Pierre Sauvage

BIOGRAFIE[1]

I was born on October 21, 1944 in Paris, just before the end of the second world war and a few months after Paris had been liberated by the allies and the French army led by General Charles de Gaulle (August 19–25, 1944). My mother's name was Lydie Angèle Arcelin and her family came mostly from Normandy. She was born in 1920. My father was Camille André Sauvage and came from the northern part of France. Camille Sauvage was known as a successful jazz musician, both conductor and clarinettist on top of being a composer. Just after the war, he was a popular jazz player and, later on, he composed for French radio, television and movies. When I was a baby, my parents broke up. I stayed with my mother while my father departed to pursue an artist's life. While I was still a young child, my mother met an officer in the air force, Marcel Louis Grosse, and they founded a family. I was thus fortunate to have a stepfather who took care of me until I became an adult and whose role was truly that of my father. Thus, I always considered him as my real father and I still do. Since my stepfather was in the military and because my parents loved to travel from one place to another, I had a very mobile childhood. When I was three years old, we moved to North Africa, as Algeria and Tunisia were still French colonies at that time. I still have vivid memories of our time in Zarzouna, a small village close to Bizerte in Tunisia. I also spent some time near Oran, in Algeria. I went to school in Tunisia between the ages of 5 and 7. At that time, the French kids and the local Tunisian kids were together in the same classes and I do not believe there were any difficulties related to the fact that the French kids and the Tunisian ones were mingling.

My mother and my grandmother, Suzanne Arcelin, were very close to one another and my grandmother, who used to live in Paris, visited our family a few times. On one particular occasion, we went to southern Tunisia for sightseeing and the photo which is shown below is particularly representative. It was taken when I was about 4 years old.

[1] https://www.nobelprize.org/prizes/chemistry/2016/sauvage/biographical/

Figure 1. In Tunisia with my mother and, on the left, my grandmother.

From 1951 to 1952, my family spent some time in the USA since my stepfather had to become a military engineer in the field of radar applications, a relatively new technology at the beginning of the 50s. We thus spent 6 months in Saint Louis, Missouri, followed by an additional period of 6 months in Denver, Colorado. I had no difficulty in adapting and, in Denver in particular, I used to play with the other children of our neighbourhood. In Saint Louis, we used to go to the movie theatre from time to time and it was of course a very enjoyable event for me. The picture shown below is interesting in the sense that one can see who were the most popular actors of the time.

Figure 2. After a movie in Saint Louis (USA) in 1951.

When we returned to France, we started a long period of itinerancy, spending a few months in a given place before moving to a new city. I thus went to 4 or 5 different schools in the western part of France and in the Paris area when I was 8 to 10 years old. My mother became ill when I was about 10, and it was a difficult moment for my family. She had contracted tuberculosis, which was a very serious disease in the 50s. I was thus mostly with my grandmother for about a year, in the family village of Pacy-sur-Eure in Normandy. After this period, I was again with my parents, who moved to the eastern part of France in the Lorraine region. When I was 15 years old we moved to a small village in the north of Alsace, Drachenbronn, because my stepfather had been transferred to the radar station located on the Maginot Line named "Base Aérienne 901 Drachenbronn." This move coincided with the beginning of my high school studies and I thus went to the high school in Haguenau, a middle-size city not far from air base 901.

I started to be very interested in chemistry when I was 15 or 16 years old and, in particular, I liked to play with natural molecules such as chlorophylls which I extracted from plants. I had a small and very primitive chemistry lab in the cellar where I was separating chlorophylls on paper or distilling various mixtures. At school, I was probably better in mathematics than in physics or chemistry but the interest of pupils for various topics is obviously very dependent on the personality of the teacher.

After my 'baccalauréat' (the French examination obtained at the age of 18 which enables one to begin university), I decided to enter a special and highly competitive structure named 'classes préparatoires' which was aimed at preparing the young people to compete for admission to engineering schools. Thus, after two years of a rigorous regime where leisure was limited to a strict minimum, I succeeded and I was admitted to the Chemical Engineering School of Strasbourg. This was exactly what I wanted since I could stay in my new but already beloved city.

I obtained my engineering diploma in 1967 and started my PhD thesis in 1967 under the guidance of Professor Jean-Marie Lehn. Jean-Marie had founded his own research team a few years before I started to work with him. He was only 5 years older than I and his research team was developing rapidly in terms of size and breadth of his research interests. Being more a physical chemist up until 1967, he had become interested in making new molecules with novel properties when I started with him. At the time Bernard Dietrich, formally a technician, decided to start his studies so as to become a graduate student, hoping also to do a PhD thesis. Bernard rapidly became my best friend and we worked together in the friendliest atmosphere imaginable between 1968 and 1971. Under the guidance of Jean-Marie we were highly successful, since we made the first macrobicyclic compounds able to encapsulate various ions, including alkali and alkaline earth metal cations (cryptands and cryptates for the metal-free compounds and their complexes respectively). In Jean-Marie Lehn's research group, I was able to acquire a solid background in organic and physical chemistry, thanks to my own work and to various seminars and group meetings as well as to the many hours I used to spend in the library. Discussions with Professor Lehn and with other members of the group were also very fruitful. Equally important was the influence that Jean-Marie had on me in terms of the relationship between researchers within a group. In particular, I enjoyed his way of managing a research team. He was very direct, placing basically no barrier between him and the PhD students or postdocs he was working with. In other words, hierarchy was reduced at its minimum and this is something which I tried to preserve later on in my own group. Inspired by Jean-Marie's passion for science, I also became enthusiastic and determined to devote my life to research.

I met my wife Carmen in 1967 and we got married in February 1971. Carmen was a student in History of Art and Archaeology. She was particularly interested in ancient ceramics and had participated in several excavation campaigns on the Anatolian plateau, in Turkey. Although we were not especially religious, we had a religious wedding mostly to respect family traditions (Figure 3). The wedding took place in Thierenbach, a village in the south of Alsace which used to be a place of pilgrimage and which is nowadays famous for its basilica.

Figure 3. The wedding ceremony in Thierenbach, February 8, 1971.

We were very happy to become parents of a baby boy, Julien Clément Sauvage, on July 13, 1975. It was a great joy for us. Since Julien's early childhood we have been very close to him. In 2011 Julien married Diana, originally from Colombia, and since 2012 they settled down in San Francisco. They had a baby on April 9, 2016 so that Carmen and I became the happiest grandparents in the world.

At the end of my PhD thesis work, I obtained a CNRS position as 'chargé de recherche' (research assistant) in Jean-Marie Lehn's group, which corresponded exactly to what I was so eager to get.

After my PhD thesis, I obtained a postdoctoral fellowship in Oxford (UK) where I spent a year in the research group of a very visible organometallic chemist, Dr Malcolm L. H. Green. Malcolm was considered as one of the most brilliant former students of Professor Geoffrey Wilkinson (1973 Nobel Laureate in Chemistry with Professor Ernst Otto Fischer). He was a very influential person

in expanding my interests to transition metal chemistry and organometallic chemistry. He was also a friendly person who used to do experimental work by himself from time to time. Life in Oxford was particularly pleasant and we used to enjoy the city, its colleges and its parks. We easily adopted the way of life of the other members of the Oxford community.

After my postdoctoral stay in Oxford, I came back to Strasbourg and more precisely to the Lehn laboratory as a permanent researcher. After some work in the field of chiral crown-ethers, Jean-Marie and I initiated a research project in a new field, at least in Strasbourg. It was related to photochemistry and solar energy. The first oil crisis took place in 1973 and it was a clear signal that alternative energies had to be found and that sustainable energies were crucially needed. Solar energy was an obvious and especially attractive option. A particularly appealing project was that of splitting the water molecule to H2 and ½ O2 in order to generate a non-polluting fuel, H2, using photonic energy. Such a big project had already been explored for many years by several groups and there were already discussions and research works published on this general topic in the 50s and later on. More or less at the same time, the ruthenium complex Ru(bipy) 32+ (bipy : 2,2′-bipyridine) was shown to display promising electronic properties in its ground or excited states, in particular in relation to electron transfer and potentially photochemical water splitting. In 1977 we published one of the very first systems leading to photochemical water reduction to H2 based on a combination of species such as in particular Ru(bipy)32+ as a photoactive species and Rh(bipy)33+ as an electron relay leading to H2 formation. After two years of studies on this original system (with Jean-Marie Lehn and Michele Kirch) and related ones as well as on the development of a light-driven oxygen generating system from water (with Jean-Marie Lehn and Raymond Ziessel), I was lucky enough to be promoted to the position of CNRS Research Director, the equivalent of University Professor. I thus founded my own research group in 1980, at first with two highly motivated PhD students, Pascal Marnot and Romain Ruppert. After one or two years, Jean-Paul Collin, a CNRS fellow, and Marc Beley, an Associate Professor, joined our small team. Simultaneously a good friend of mine, Christiane Dietrich-Buchecker, also joined.

As it is often the case for young research teams, we tackled several research projects in parallel in relatively remote areas. Electrochemical reduction of CO2 using [Ni cyclam]2+ as an electrocatalyst led to remarkable data since CO2 could be reduced very selectively to CO in water. This was somewhat surprising since H22 was expected to be obtained as a major reduction product. We also did work in homogeneous catalysis and inorganic photochemistry. In this latter field, our projects were mostly triggered by a collaboration with David R. M. McMillin, who was on sabbatical leave in Strasbourg. David was an already well established photochemist and photophysicist. He was a professor at Purdue University (West Lafayette, Indiana, USA) and his main field of research was photochemistry of copper(I) complexes. This collaboration between our group, with its skill in organic synthesis, and David led to a series of particularly interesting photoactive copper complexes. Perhaps even more importantly, it led to a copper(I) complex containing two intertwined organic ligands which appeared to be the ideal precursors to a compound comprising two interlocking rings. It was thus very tempting to jump from inorganic photochemistry to interlocking ring compounds which, at the beginning of the 80s, seemed to be practically inaccessible molecules. This jump was made possible due to the expertise of Christiane Dietrich-Buchecker, who was a great organic chemist. After a few discussions within our team, we decided to take the risk and to embark on a totally new project concerned with the synthesis of catenanes (i.e. interlocking ring compounds). Within a few months, Christiane was able to develop an efficient preparative procedure for making our first [2]catenane (containing 2 interlocking

rings). Respectable quantities could be obtained: batches of 0.5g could be prepared, in particular by Jean Weiss, a PhD student also supervised by Christiane, and the first compound was fully characterised using a variety of techniques. 1NMR provided the first convincing evidence that a [2]catenane was indeed produced. These experiments were carried out by Jean-Pierre Kintzinger, a friend of mine and the brother-in-law of Christiane, who was at the same time an NMR expert. We published our first paper in this field in 1983 in an acceptable but not high-impact journal (Tetrahedron Letter). For us it was the beginning of a new era, mostly but not exclusively devoted to interlocking rings compounds and knotted molecules. The field has often been referred to as "Chemical Topology" due to the fact that the compounds have non-planar molecular graphs. In other words, contrary to almost all the molecules known, it is impossible to draw them in a plane (i.e. a sheet of paper) without crossings, regardless of the deformation the molecule can be subjected to.

Besides chemical topology and molecular machines, our group has been active in various relatively remote fields. The principal alternative research area has been that of artificial photosynthesis, with a particular emphasis on photoinduced charge separation, one of the key processes of natural or artificial photosynthesis. In order to elaborate efficient models of the natural photosynthetic systems, and in view of realising the complete water splitting cycle in the future, our group synthesised numerous multicomponent complexes, either incorporating metal-complexed porphyrins or second or third row transition metal complexes (Ru, Os, Rh and Ir) able to undergo light-induced charge separation. Following the synthetic work, the photochemical and photophysical properties of most of the compounds were investigated in various places by more physical chemistryoriented research teams than ours. In particular a long-term collaboration with renowned photochemists located in Bologna turned out to be especially pleasant and fruitful (Balzani and his co-workers, University of Bologna, or Flamigni and Barigelletti, Consiglio Nazionale delle Ricerche, Bologna). Some of the charge separated states were shown to be remarkably long-lived, thus paving the way to real artificial photosynthetic devices reminiscent of the photosynthetic apparatus of green plants or photosynthetic bacteria.

I would like to stress that encounters with various people played a very important role in my professional life. Two teachers were particularly influential when I was a student: Raymond Weiss, who was a very rigorous physical and inorganic chemist, and Guy Ourisson, an exceptional organic chemist who was able to convince all the students he was teaching to that organic chemistry is exciting and can even be fun. Jean-Marie Lehn also had a great impact on my enthusiasm for science and to me he was the perfect model, although this model was totally out of reach. One of the most important encounters was that with Christiane Dietrich-Buchecker, a wonderful person and a great organic chemist whose contribution to the scientific production of our group turned out to be determinant. Finally, it may appear as surprising that Fraser Stoddart and I never looked at each other as competitors. Even more, we both tried to avoid any overlapping with the activities of the other research team. This is mostly because we became friends at the end of the 70s and this was the beginning of a faithful friendship which allowed us to work in a more serene atmosphere than if we had tried to overtake each other. Between 2010 and 2013, I was appointed as visiting professor at Northwestern University, where I collaborated primarily with Fraser and his team. I also enjoyed interacting with other colleagues at this great university. I am particularly grateful to Fraser for arranging for me to get such a position.

Figure 4. One of the ceremonies held in Strasbourg (1988) to honour Jean-Marie Lehn's Nobel Prize (1987). On this special occasion, the chemist community gathered in a friendly atmosphere (as testified by the number of smiley people on the picture). From left to right, the four persons at the front row are Jean-Marie Lehn, Jean-François Biellman, myself and Guy Ourisson. My very good friend Bernard Dietrich (1940–2004), who was also one of the main contributors to the early work on cryptands and cryptates, is at the second row just behind J.-F. Biellman.

I would like to conclude with two pictures separated by approximately 29 years. The first one, Figure 4, was taken at the ceremony to honour Jean-Marie Lehn's Nobel Prize in 1987. This ceremony took place in the Great Lecture Hall of the Chemistry Department of our university. The second picture, Figure 5, is much more recent since it was taken in Stockholm just after the December 10, 2016 ceremony.

Figure 5. Picture taken on the stage after the Nobel Ceremony with the Royal Family. From left to right: Annelie Almkvist, our Attachée; Diana Sistiva, our daughter in law; Julien Sauvage, our son; Carmen Sauvage, my wife; myself and Jean-Marie Lehn