

## Curriculum Vitae of Prof. Fausto Elisei

Professor of Physical Chemistry of the University of Perugia.

Born in Spoleto (PG) on 1955, he graduated (laurea) with honour in Chemistry from the University of Perugia (1979).

Researcher at the Institute Guido Donegani - Novara (1981-1983).

Assistant Professor of Physical Chemistry at the University of Perugia from 1984 to 1998.

Visiting Research Staff Member at the Max Planck Institut für Strahlenchemie - Mülheim ad Ruhr - Germany (1985 and 1989).

Appointed Associate Professor in 1998 and Professor in 2004 at the Faculty of Mathematical, Physical and Natural Sciences of the University of Perugia.

Component of the Department of Chemistry, Biology and Biotechnology (2014-today).

### RESEARCH ACTIVITY

His research activity has been mainly devoted to subjects of Photophysics and Photochemistry. In particular the properties of the electronic excited states of aromatic and ethero-aromatic compounds have been mainly investigated by steady-state and transient techniques, sometimes also by quantum mechanical calculations. Such investigations, carried out on several classes of aromatic compounds, have generally been devoted to a complete description of the mechanisms of the reactive and non-reactive processes induced by light absorption and to look at the molecular properties and experimental conditions able to control the reaction yields and directions.

With this aim, the characteristics of the lowest excited singlet (S<sub>1</sub>) and triplet (T<sub>1</sub>) states have been studied both in fluid media and in solid matrix together with the kinetic behaviour of their competitive decay processes. For some compounds (mainly ketones) the photophysical and photochemical properties have also been evaluated in microheterogeneous media. The characterization of the transient species produced upon direct irradiation of the substrates allowed to describe the mechanism of some important photochemical reactions (cis-trans photoisomerization, photoinduced electron transfer, energy transfer, photodissociation, photocyclization, photoelimination, photoreduction) in different experimental conditions (solvent, temperature, additives) and to state the molecular structure effect on the rates of the decay processes of the lowest excited states. In case of photoactive compounds (drugs and phytodrugs) it has been possible to characterize the action mechanism towards biological substrates (nucleic acids, fatty acids, proteins, bacteria), with particular respect to reactive species of molecular oxygen.

Recently, new hybrid (organic/inorganic) nanostructured materials (hydrotalcites and nanoparticles) have been prepared; their structures were characterised together with the photophysical properties. Fluorescence images and spatial resolved fluorescence spectra of nanostructured solid materials, obtained by confocal fluorescence microscopy and combined with the images obtained by atomic force microscopy (AFM), gave information on the fluorophor distributions and on the local properties, together with an accurate dimensional and morphological description of the systems under investigation.

More recently, time-resolved spectroscopic and kinetic investigations with femtosecond resolution (pump-probe absorption and fluorescence up-conversion) allowed the primary deactivation pathways of molecular systems and of their complexes with charged species to be characterised in fluid and organised media.

The research activity can be subdivided in the following main subjects:

- a) photophysical properties, cis-trans photoisomerization and photoreduction of arylethenes;
- b) charge transfer interactions between polycyclic aromatic hydrocarbons and electron donors and acceptors;
- c) photophysical and photochemical behaviour of bioactive compounds, interactions with DNA and proteins, and singlet oxygen sensitisation;
- d) synthesis and spectroscopic characterisation of nanostructured materials;
- e) optical properties of scintillator mixtures;
- f) ultrafast decay processes of dipolar and quadrupolar organic compounds.

The results of the research work in these fields were the subject of about 180 scientific papers published in international journals (<http://www.researcherid.com/rid/G-3604-2010>) and many communications to national and international congresses. According to ISI Web of Science, H-index = 34 and n. of citations ca. 5000 (February 2018).

Quality Assessment Research (VQR): he received an overall rating of 3 of 3 for the products presented for the years 2004-2010 and 2 of 2 for those presented for the years 2011-14.

He has the requisite qualifications to be part of the Commission for National Scientific Enable, competitive sector 03 / A2 - Models and Methods for Chemical Sciences (DD n. 350 of 12 November 2012, DD n. 37 of January 8, 2013, DD n. 1531 of July 29, 2016).

Referee of international journals such as Journal of the American Chemical Society (ACS), Journal of Physical Chemistry (ACS), Physical Chemistry Chemical Physics (RSC Publishing), Dyes and Pigments (Elsevier), Molecular Physics (Taylor & Francis), Photochemistry and Photobiology (Wiley), Photochemical and Photobiological Sciences (RSC Publishing), Journal of Photochemistry and Photobiology, A: Chemistry (Elsevier), Physica Status Solid (a) (Wiley).

Member of the Italian Chemical Society, Division of Physical Chemistry, which the Board has also served in 2005 and 2006.

Member of the Italian Group of Photochemistry (GIF) and the European Photochemistry Association (EPA).

#### COORDINATION OF RESEARCH ACTIVITY

Scientific leader of the research group "Photophysics and Photochemistry" of the Department of Chemistry, Biology and Biotechnology.

Researcher projects and research funding on a competitive basis:

Coordinator of a Research Unit of the FIRB 2001 n. RBAU01PPHX\_002 *Electron transfer in organic and enzymatic processes: basic aspects, the study of reactivity, possible applications*, supported by the Ministry of Education.

Coordinator of the project *Photophysical and photochemical characterization of organic chromophores in nanostructures and their applications*, within the Centre of Excellence on Innovative Nanostructured Materials for chemical, physical and biological applications (CEMIN), supported by the Ministry of Education and University of Perugia.

Principal investigator of the research project 2005 *Synthesis and application of biosystems hybrid sensors based on emission of semiconductor nanostructures*, supported by the Fondazione Cassa di Risparmio di Perugia.

Principal investigator of the national project Prin 2008 n. 20088NTBKR *Spectroscopy and dynamics of organic compounds: effect of the structure of the medium and the properties of electronic excited states*, supported by the Ministry of Education and the University of Perugia.

Principal investigator of the national project PRIN 2010-2011 n. 2010FM738P *Photophysical and photochemical properties of organic compounds and biological interest in solution and in organized systems*, supported by the Ministry of Education and the University of Perugia.

Coordinator of the OR2e Activity *Development of immobilized enzymes on supports for the effective disaggregation of biomass*, research project BIT3G 2014-2017 n. CT-N01\_00063\_49295, supported by Ministry of Education and the University of Perugia.

Principal investigator of the research project 2015 *Hydrolysis of organic biomass and production of "biobased chemicals" by an enzyme*, supported by the Fondazione Cassa di Risparmio di Terni and Narni.

Coordinator of the Photochem laboratory, Department of Chemistry, Biology and Biotechnology, Department of Excellence 2018-2022, supported by Ministry of Education and the University of Perugia.

#### TEACHING ACTIVITY

Professor of Analytical Chemistry and Physical Chemistry in the Degree in Chemistry (1992-today).

Professor of Physical Chemistry in the Degree in Biotechnology (2001-today).

Professor of Photobiology at the School of Specialisation in Dermatology and Venereology, Faculty of Medicine (1999-2009).

#### COORDINATION OF TEACHING ACTIVITY

Founding member of the Commission of the Degree in Biotechnology (2000-2001).

Member of the Coordinating Committee of the Degree in Biotechnology (2001-2013).

Project Coordinator CRUI CampusOne Biotechnology for the assessment of the effects of the innovative university reform 2002-2005.

Coordinator of the Erasmus projects Universities Rovira i Virgili (Spain), Malta (Malta) and Karlstad (Sweden) (2002-today).

Member of the Academic Board of the PhD in Chemical Sciences (2005-2014).

Director of the University Master of 2nd Level: Biotechnological methodologies for environmental clean-up (2004 and 2005).

Director of the University Master of 1st Level: Biotechnology for environmental restoration (2009).

Dean of the Faculty of Mathematical, Physical and Natural Sciences of the University of Perugia (2009-2013).

Member of the Academic Board of the PhD in Biotechnology (2013-today).

#### MANAGEMENT AND ADMINISTRATION

Member of the Board of Governors, University of Perugia (1999-2004 and 2014-today).

Coordinator of the Budget Committee of the Board of Governors (2001-2004).

Board member (2001-2010) and Coordinator (2007-2010) of the "Nucleo di Progettazione" of the University (2001-2010);

Founding member and Board member (2003-today) and President (2014-today) of the Center of Excellence on Innovative Nanostructured Materials for chemical, physical and biological applications (CEMIN).

Member of the University Executive Committee (2004-2009).

Deputy Rector for the Prevention and Safety and for the University Sports Centre of Perugia (2005-2013).

Member of the Executive Committee of the Foundation "ITS - New Technologies for Made in Italy" (2011-2014).

Member of the University Senate, University of Perugia (2009-2013); president of the Research Committee (2011-2013).

Founding partner of the Academic Spin Off "Enzyme & Cell Biosolutions".

Perugia, February 2018