



### **Roberto Pini**

Institute of Applied Physics (IFAC-CNR) National Research Council of Italy, Italy

---

Roberto Pini, is presently the Director of the Institute of Applied Physics of the CNR and contract professor at the Dept. of Physics, University of Florence, Italy. His areas of interest are: technology of many types of laser and LED sources; laser-materials interactions for biomedical and industrial applications; biomedical optics and biophotonics, including advanced microscopy and spectroscopy, optical nanosensors, nanomedicine. Applications are in laser surgery for ophthalmology, dermatology and wound healing, diagnostics and treatment of cancer and age-related diseases, laser material processing, photonics for the aerospace. He is co-author of more than 250 scientific publications, including 5 books. He is also co-inventor of 22 patents, all of them in the fields of lasers and biomedical optics.

#### ABSTRACT

#### **Novel plasmon-enhanced Raman platforms for ultra-sensitive recognition of neurodegenerative proteins**

Surface-Enhanced Raman Spectroscopy (SERS) is an ultrasensitive analytical technique that couples the chemostructural information provided by the Raman scattering to a signal enhancement due to localized surface plasmon resonances in noble metal nanostructured substrates. Here we present novel platforms implemented in our laboratories for SERS detection of biomolecules. In particular, we will report recent results on amyloid beta ( $A\beta$ ) oligomers, considered as precursors in the aberrant protein aggregation processes related to the Alzheimer's disease. Moreover, we will report studies aimed at unravelling the relationship between structure and neurotoxicity of such proteins performed by means of Tip-Enhanced Raman Spectroscopy (TERS), which combines SERS with scanning probe microscopy (SPM) to provide Raman analysis with nanoscale spatial resolution.

*Novel plasmon-enhanced Raman platforms for ultrasensitive recognition of neurodegenerative proteins*

*Roberto Pini<sup>1,\*</sup>, Cristiano D'Andrea<sup>1</sup>, Martina Banchelli<sup>1</sup>, Maximilien Cottat<sup>1</sup>, Marella de Angelis<sup>1</sup> and Paolo Matteini<sup>1</sup>*

<sup>1</sup> *Istituto di Fisica Applicata "Nello Carrara" (IFAC), Consiglio Nazionale delle Ricerche, Via Madonna del Piano 10, 50019 Sesto Fiorentino, Italy*

<sup>\*</sup> *Email: r.pini@ifac.cnr.it*