



### Short Visit Proposal – Final Report

#### Use of dielectric nanoantennas for surface enhanced spectroscopies

Visit to Donostia International Physics Centre, Prof Javier Aizpurua, 23/7/2014 – 27/07/2014

During this visit we discussed a number of new collaboration ideas centering on the use of dielectric nanoantennas for use in surface enhanced spectroscopies.

In contrast to metallic nanoantennas, dielectric nanoantennas do not suffer heating losses if excited below the bandgap of the semiconductor material (Si, GaP, GaAs), hence any molecules in its vicinity will not sustain heating-induced damage. Crucially, hot spots of electromagnetic energy with a mode volume below the diffraction limit are still possible, particularly in dimer antennas. Clearly, the relative field enhancement is less than with plasmonic (metallic) antennas, due to the lower permittivity contrast and the absence of plasmon modes, but the absolute power delivered to a nanoscopic area has the potential to be large, due to the fact that the illuminating laser power can be increased without danger of melting the antenna.

Additionally, I took part in a one-day workshop presenting recent research obtained in my group under ESF funding, which also allowed the inclusion of new collaborator Prof Saenz from the Universidad Autónoma de Madrid into the collaboration.

Specific outcomes of the visit included:

- The presentation of ESF-co-funded research to an audience of ~60 researchers at a one day workshop
- Discussions leading to the anticipated submission of a Horizon 2020 FET proposal on the topic of dielectric nanoantennas
- Planning of first steps to jointly investigate the use of such antennas in surface enhanced spectroscopies
- The identification of group members at both ends that will take part in the research
- A discussion of presentations at the ESF network final meeting in 2015.