

JSPS-EPSRC Collaborative Symposium: Materials Science Pioneered by Structured Lights, 6th January 2017

On 6th January 2017, a symposium jointly organized by the Engineering and Physical Sciences Research Council (EPSRC) and the Japan Society for the Promotion of Science (JSPS) London office was held at The Royal Society in London, with over 60 attendees from institutions all over Japan and the UK. The theme of the event was research advances in optoelectronics and the invited talks explored the latest developments in many potential applications.

Opening remarks were given by the Director of JSPS London, Professor Nobuo Ueno who spoke of there being much synergy of interests and possibility for collaboration between Japan and the UK in the field of optoelectronics and that he hoped this symposium would be an arena to facilitate these research links. This was followed by the first session of presentations. The first speaker was Professor Hiromi Okamoto from the Institute of Molecular Science in Japan, who discussed his research on ultrafast near-field imaging of plasmon wave packet dynamics and chiral optical field structures. The second speaker, Professor Malcolm Kadodwala from the University of Glasgow presented his latest research on the interaction of chiral nanostructures and biomaterials using concepts from physical chemistry and atomic and molecular physics; orbital hybridisation and quantum interference phenomenon such as electromagnetic induced transparency. The next speaker was Professor Satoshi Ashihara from the University of Tokyo who explained about his recent progress on infrared plasmonics and temporal/spectral responses of local-field enhancements achievable with MIR-resonant metal nanoantennas, and its application to strong-field photoemission. The final speaker in this session was Professor Thomas Krauss from the University of York. His talk centered on current work around the novel use of photonic crystals in sensing and imaging architecture. This session was followed by lunch.

In the second session the first speaker was Dr Kyosuke Sakai from Hokkaido University who discussed about how plasmons can provide a new route to transport physical quantities, e.g. energy and momentum, from photons to electrons and the first step of this route in which angular momentum is transferred from photons to plasmons. The final speaker in this session was Dr David Phillips representing the work of Professor Miles Padgett's group at the University of Glasgow. His presentation focused on developments in mimicking animal vision to enhance the performance of a computational imaging system and how this architecture provides unusual video streams in which both the

resolution and exposure-time spatially vary and adapt dynamically in response to the evolution of the scene. This session was followed by a coffee break.

In the final session the first presentation was given by Professor Stefan Maier from Imperial College London who examined the current understanding of how metallic nanoparticles allow for the controlled focusing of electromagnetic energy from the far to the near-field and the establishment of nanostructured fields of light. He also outlined the fundamental physics of this process and presented challenges in the direct imaging of sub-diffraction-limit plasmonic light fields and applications in nonlinear optics and surface-enhanced spectroscopies. The next presentation was given by Professor Takashige Omatsu from Chiba University who explained his current work on chiral structures formation by illumination of optical vortices, addressing the use of advanced twisting light sources such as a widely tuneable mid-infrared optical parametric vortex laser. The final presentation of the symposium was given by Professor Kishan Dholakia from the University of St Andrews. He presented his latest studies on the trapping of particles in liquid, air and vacuum with an emphasis on exploiting the material properties of the particle. Many questions ensued after each presentation, discussing experimental processes and suggestions for development of applications, stimulating a very clear potential for collaboration.

The symposium was brought to an end with closing remarks from Mr John Hand, theme lead for physical sciences at the EPSRC and Professor Takashige Omatsu, academic lead of the programme for the symposium. The group photo below was then taken and delegates were invited to join a reception hosted by the Japanese Embassy near-by to celebrate the ongoing partnership between JSPS and the EPSRC. During this reception the first of three sets of remarks were given by Mr Hiroshi Matsuura, Minister of Economic Affairs at the Embassy of Japan in the UK, followed by Professor Nobuo Ueno and Mr John Hand who all expressed their hope for a closer working partnership between the EPSRC and JSPS. These remarks were followed by a presentation from Ms Ogaya, Deputy Director of JSPS London, who explained about the JSPS Core to Core programme and the coordinated call of the EPSRC with this programme which, as a large funding mechanism to build research hubs over a 5 year period, has had a great effect on UK-Japan research collaborations. Professor Atsufumi Hirohata, member of the JSPS London network for Japanese researchers in the UK, demonstrated this point by explaining the

successes of his current Core to Core programme project jointly funded by JSPS and the EPSRC and also includes research groups in Germany. Following this keynote lecture the attendees were invited to enjoy the rest of the reception and use the time to build on the success of the day's symposium to continue discussions and networking.



Symposium Attendees