

UCL-JAIST 3 year PhD studentship for September 2015

Design and syntheses of novel high magnetic moment nanoparticles through computation chemistry

Supervisors Prof Nguyen T.K. Thanh, Department of Physics and Astronomy, UCL (<http://www.ucl.ac.uk>; <http://www.ucl.ac.uk/ref2014>) and Associate Prof Mikio Koyano and Prof S. Maenosono School of Materials Science, JAIST (<http://www.jaist.ac.jp/index-e.html>)

Project timeline:

- **Year 1: Student research/training in UCL**
- **Year 2: Student collaborative research in JAIST**
- **Year 3: Student back in UCL**

Microwave synthesis of NPs is a relative new technique, that can provide high heating rates, thus increasing the reaction rate, excellent control of the reaction parameters, selective heating (if the reaction mixture contains compounds with different microwave absorbing properties); higher yields; better selectivity due to reduced side reactions; improved reproducibility; and automatization and high throughput synthesis¹.

High magnetic moment nanoparticles can be formed of pure metals such as Fe, Co or alloy FeCo, but these materials are easily be oxidised, subsequently lost their magnetic moment. Efforts have been in designing the coating the core with various materials such as gold, silica with little success so far. The computation chemistry will help in choosing different coating materials that was not explored experimentally with the crystal lattices close to the core materials.

In this project, the student will be trained in the synthesis of nanomaterials in Prof Thanh's very well equipped synthetic lab with a modern microwave synthesiser. Prof Ozaki will supervise the student on the aspect of computational chemistry. The synthesised high magnetic moment NPs will be characterised at UCL and JAIST using DLS (Dynamic light scattering), Transmission electron microscopy (TEM) for size, shape and monodispersity of nanomaterials, thereby enabling the determination of the successful synthesis. X-Ray diffraction (XRD) will also be used at later stage to characterise further the structure of materials, and Superconducting QUantum Interference Devices (SQUID magnetometer) will be used to characterise the magnetic properties of the materials. The students will also experience advanced characterisation techniques such as XPS, HRTEM, TGA, ICP-AES in Prof Meanosono's lab

Student is registered in UCL, but needs to be accepted by JAIST. The candidate required to have 1st or 2:1 class Integrated Masters degree (MSci, MChem, etc.) or 1st or 2:1 BSc plus stand-alone Masters degree Merit/Distinction in Chemistry, Materials Science, Physics and Biochemistry.

Applications will be accepted until 30 April 2015. However, the recruitment will cease as soon as a suitable candidate is found.

Please send CV and research statement to Prof. NTK Thanh (Email: ntk.thanh@ucl.ac.uk) with the Subject Ref: UCL-JAIST PhD studentship for consideration, due to the large number of applications, only shortlisted candidates will be contacted and invited to make a formal application.

The position is only available to EU or UK students. Overseas students with their own funding for tuition fee and bench fee can apply.