

## PhD Scholarship in development of downshifting nanocrystals for increased crop yields

**Description:** Plant growth can be enhanced using light tailored for different plant types. Nanomaterials can be harnessed to convert higher, harmful, or unused light frequencies to lower, photosynthetically useful light frequencies that can help increase crop yields of some plants by up to 20%. However, the available nanomaterials are either expensive, toxic, or inefficient.

This PhD project, joint between LSBU and industrial partner “Lambda Energy”, aims to develop low-cost, non-toxic and highly efficient spectral converters for agritech to enhance the process of photosynthesis in plants. For that, PhD student will design and synthesize highly efficient nanocrystals (with quantum yield of > 80%), that can perform downshifting via process akin to quantum cutting. A range of characterisation techniques including an integrating sphere for measuring the quantum yield of the particles; time-resolved spectroscopy, UV-Vis spectroscopy and photoluminescence spectroscopy for characterising the optical properties of the films; SEM for morphological information; XRD and EDX for compositional / elemental characterisation will be employed. Finally, an agritech set-up will be used to test these nanoparticles as spectral converters.

The outcomes of this project for the PhD candidate are listed below:

- synthesis of highly efficient nanocrystals.
- gain experience in time-resolved spectroscopy and other characterisation techniques;
- perform experimental measurements to develop the general rules of a good spectral converters for Agritech;
- perform testing of nanomaterials-based spectral converters in real agritech set-up;
- present the findings of the project in international conferences;
- perform high-quality research and publish it as journal articles.

The PhD bursary will cover fees and a £18k stipend per annum for three years. As part of the candidate’s academic development, the School of Engineering bursary agreement includes that the successful PhD candidate engages in 4 hours per week student contact time, comprising lab class assistance and extracurricular activity development. If you have any informal query, please email the supervision team directly. We encourage applications from underrepresented groups.

**Supervisory Team:** The successful applicant will be working with [Dr Tariq Sajjad](#), [Dr Suela Kellici](#) ([www.nano2d.co.uk](http://www.nano2d.co.uk)) at LSBU and [Dr Monica Saavedra](#) at Lambda Energy. As a PhD student, you will join the [London Centre for Energy Engineering](#) and work alongside new and experienced PhD students in a collaborative environment.

Informal enquiries should be directed to Dr Tariq Sajjad ([sajjad@lsbu.ac.uk](mailto:sajjad@lsbu.ac.uk)). Please send a copy of your CV with a covering letter directly to Dr Tariq Sajjad before applying.

**Requirements:** Applicants must be of outstanding academic merit and should have (or be expected to gain) either a first class or an upper second class Honours degree (or the international equivalent), or an MSc/MRes with distinction. Enthusiastic and self-motivated candidates from all countries with a background in either Material Science, Chemistry or Physics or a related discipline are encouraged to apply. A good knowledge or experience in Material synthesis, material characterisation would be advantageous.