

MASSIVE Industrial Advisory Group

The third annual meeting of the project's Industrial Advisory Group was held on 21st March 2017 at the Institute of Materials, Minerals and Mining, London, attended by members of the university research teams and representatives from eight of our partner companies. Project lead Robert Dorey gave an overview of progress on MASSIVE to date and researchers from Cranfield, Manchester, QMUL and Surrey presented ongoing work addressing powder synthesis, film processing techniques and environmental and health risk assessment of substitute functional materials. The Advisory Group provided the academic teams with valuable feedback on the business drivers and manufacturing issues most relevant to scaling up the use of these materials, including the need for metrics for processing parameters and quality of starting materials. A number of co-funded, short-term Feasibility Studies aimed at technology transfer have already been completed or are currently in progress and we welcome proposals for additional **collaborative projects** to enable us to engage with our industry partners.

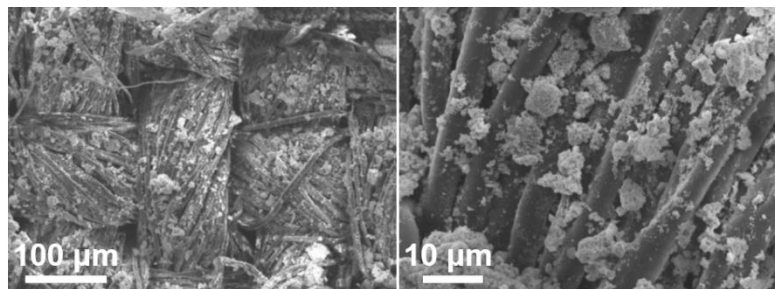
Student project highlights

Here we take a brief look at the main outcomes of a few of the engineering student projects undertaken this academic year within the University of Surrey's **Functional Nanomaterials** laboratory which have focused on materials and applications aligned with MASSIVE.

Design and modelling of thick film thermoelectric generators and vibrating piezoelectric energy harvester structures This finite element analysis study of printed flexible substrate thermoelectric generators (TEGs) has modelled the effect of material choice and geometrical parameters on power density and efficiency, identifying geometries which give a balance of these properties. In addition to the energy producing characteristics of the TEG, manufacturability and durability will be considered in future work to make an actual device. In a related project, a similar approach has been used to model resonance frequency and output voltage as a function of geometrical characteristics of unimorph cantilever beams comprising a layer of PZT on a structural steel substrate.

Comparison of additive layer deposition on organic and inorganic surfaces A cross-disciplinary investigation of antibiotic efficacy against biofilm growth on a range of surfaces was aided by this project which used 3D printing to build up leak-free containers for liquids, formed from ABS deposited directly onto clean substrates including stainless steel, glass, polypropylene, polystyrene and meat, as well as biofilm-coated polystyrene. Optimum results were obtained with the polystyrene substrates and this study will be expanded in future to look at a number of different substrates and printing conditions.

Printed sensors on wearable textiles With the growth in potential for integrating electronics into wearable textiles for healthcare and fitness applications, this project focussed on using silver nanoparticle

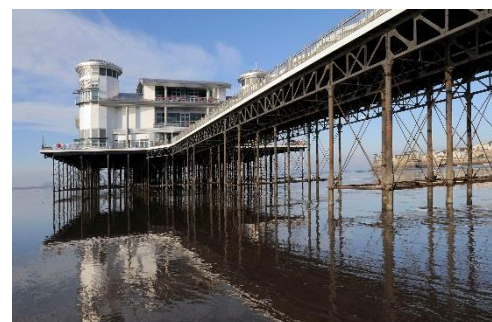


Micrographs showing the distribution of 5 vol % powder loading silver nanoparticle ink with 75% ethylene glycol painted onto cotton substrate. The particles which are in contact show that there is potentially partial conductivity. (Photo: Rebecca Tung)

development of conductive pathways in deposited films and would also be expected to influence substrate adhesion and washability of the fabric, which will form the basis of a future investigation. (Contact: r.dorey@surrey.ac.uk)

Sustainable Functional Materials (SFM) 2018

Following on from the success of the inaugural SFM meeting held in April 2016 in Scarborough, the second edition of the conference is planned for 17th and 18th April 2018 in Weston-Super-Mare, Somerset, UK. SFM2018 is being organised jointly by Robert Dorey at Surrey and Ian Reaney at the University of Sheffield and is supported by the EPSRC projects SUBST, based at Sheffield, and MASSIVE. Topics will include piezoelectrics, thermoelectrics, fuel cells, solar cells, dielectrics and energy harvesting materials, with particular focus on manufacture and scale-up of processing sustainable functional materials. The conference will be of interest both to academic researchers and to industrialists, aiming to gain the perspective of industry concerning the materials substitution and sustainability issues likely to become critical over the next 5-10 years. Abstract submission and registration will open from 1st September 2017. For further information about the conference, please contact l.boniface@surrey.ac.uk.



Conferences & Events

Sustainable Functional Materials
SFM2018
17-18th April 2018
Weston-Super-Mare, Somerset, UK

Collaborate with MASSIVE

The MASSIVE project team is continually looking to grow **industrial engagement** through its advisory group, growing its industry partner base and developing new collaborative projects. Co-funding from MASSIVE is available for collaborations with industry, including short-term Feasibility Studies enabling exploration of novel manufacturing concepts and evaluation of their potential to lead to longer-term strategic Industry Development Projects. Please get in touch if you would like to discuss working with us.

Contact Us

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