MASSIVE Newsletter

Manufacture of Safe and Sustainable Volatile Element Functional Materials

Issue 2 | June 2015

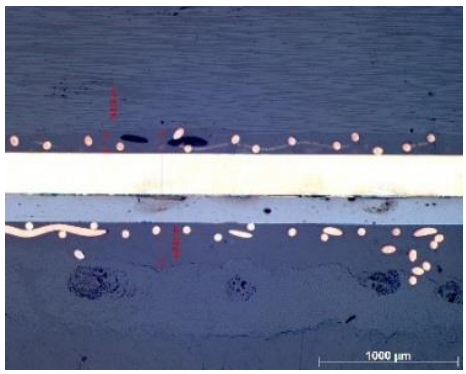
Project update

With the MASSIVE project teams now established at the **partner universities**, work is underway on the production of powders and on processing and characterisation of lead-free thermoelectric and piezoelectric films. Initial efforts at the University of Manchester have focused on the effect of composition and sintering atmosphere on thermoelectric properties of strontium- and titanium-based materials and on lead-free piezoelectrics, with QMUL currently investigating volatilisation and formation of oxides on powders. University of Surrey researchers are developing film processing techniques using telluride-based ink formulations, before moving on to sulphide formulations as a next step. Cranfield University will be leading the programme of parallel studies of the safety, security of supply and sustainability of these new materials and manufacturing processes. **Read more**

In this issue of the newsletter, we highlight some of Surrey's ongoing projects on functional ceramics which complement the work on MASSIVE.

Listening to the world break up

Thick film piezoelectrics are being integrated into glass fibre reinforced composite materials to act as acoustic emission sensors for detecting failure of composite structures. University of Surrey researchers have successfully demonstrated that the individual polymer matrix failure events can be detected by the piezo-sensors and by using multiple sensors, an indication of the location of failure can be obtained. Due to the small size of the sensors, their presence has been shown not to affect the overall strength of the composite, providing a real opportunity for integrated structural health monitoring.



Cross-section of composite with central piezo-sensor and conducting wire mesh.

Ceramic electrolysis electrodes

Conducting ceramic films have been used successfully to generate hydrogen during electrolysis of water. Porous cobalt oxide thick films have been shown to be capable of being used as electrode materials during electrolysis, demonstrating not only an increase in rate of hydrogen production but also a reduction in voltage required to initialise electrolysis. Work at Surrey is continuing to improve the effectiveness of the process through nano-and micro-scale structuring of the porous film.

Ceramic clean sweep

Researchers at the University of Surrey are looking at ways in which water can be cleaned and recycled in an energy efficient manner during washing of functional ceramics, addressing the significant issue of the large quantities of waste water produced as a result of processing. Using vapour phase transport of water molecules across nanofilters, the researchers are extracting water using low pressure airflow and without the need for thermal evaporation.

MASSIVE outreach and engagement

MASSIVE was well represented at Energy Harvesting 2015, the EPSRC Energy Harvesting Network annual dissemination event held in March, with Robert Dorey giving a keynote presentation on printed thermoelectric and piezoelectric devices and project partners European Thermodynamics Ltd among the industry exhibitors. **Read more**

Key Dates

MASSIVE Industrial Advisory Board Networking Event
15 Sep 2015, Queen Mary University of London

Conferences

UK Ferroelectrics 2015
23-24 Jul 2015, NPL

Sustainable Functional Materials 2016 (SFM2016)
5-6 Apr 2016, Scarborough
Co-organised by EPSRC project 'Substitution and Sustainability in Functional Materials and Devices (SUBST)' and MASSIVE.
Read more

Collaborate with MASSIVE

The MASSIVE project team is continually looking to grow its **industrial engagement** through maintaining an active industrial advisory board, expanding its industrial partner base and developing new collaborative projects. Please contact us if you or your colleagues are interested in pursuing these opportunities.

Contact Us

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