

## NASTRAC Project – 12 Month Progress Report – November 2009

The NASTRAC project is now over 12 months into the scheduled 36 month duration. As such, much of the initial laboratory based work at Loughborough University is complete and the positive findings have led on to initial small-scale investigations involving factory processing by both Syfer Technology Ltd and Dynamic Ceramics.

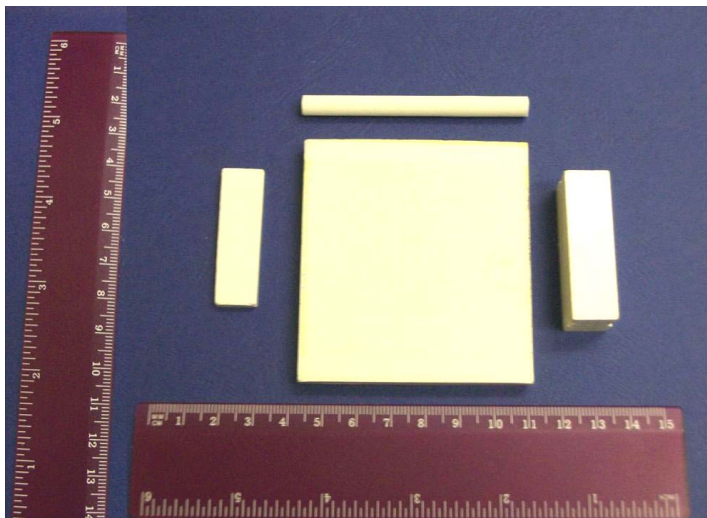
Important general milestones achieved to date are as follows:

- The Loughborough patented technology (using different combinations of evaporation, ultrasonics and judicious use of additives to raise wt% nano solids in suspension) has worked well for aqueous nano-zirconia and non-aqueous Barium Titanate systems.
- The rheology of high solids content nano suspensions has been controlled to allow subsequent processing
- Clear, viable process routes for scale-up have been identified

Specific pointers (pertinent to either zirconia or barium titanate) of note are:

### Zirconia

- A Loughborough University staff member is already working at MEL Chemicals on scale-up production (20 kilo level initially) of high solids nano-zirconia slurries.
- Freeze Dry Granulation of nano-zirconia slurries delivers a granulate with improved homogeneity
- Dynamic Ceramic Ltd has commenced pressing, machining and sintering trials with granulated nano-zirconia material supplied by Loughborough University. Early indications are that granulate properties need optimisation if defect-free compacts are to be realised.



*Components fabricated from Spray Freeze Dried nano-ZrO<sub>2</sub> granulates*

### Barium Titanate (BT)

- Interaction with supplier companies outside the consortium has provided additional support and scale-up options in terms of nano-BT feedstock supply and use of dopants.
- Initial feedback from silk-screening trials suggests nano-BT ink rheology may need tweaking to ensure clean.

During months 12-18 and beyond, the plan is to expand industrial trialling whilst maintaining close links to Loughborough University who will carry out sintering trials and monitor trends in nano-structure development that can be linked to key end properties.