Report for the experiment MA1613

Dates: From 26/10/2012 To 28/10/2012
Title: Local structure of densified Sm- and Y-doped ceria-based densified nanomaterials

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The production of ionic ceramics in bulk form received a very limited attention due to the difficulty involved in the production of these materials. In the specific case of CeO 2 base electrolytes, the specific grain boundary resistivity is much larger than the corresponding bulk value. As a consequence, the conductivity of polycrystalline samples is largely controlled by their microstructure. The possibility to reduce the grain boundary resistance by decreasing the grain size to the low nanometric range has been largely debated in the last few years. This proposal aims at the structural study of densified nanosized CeO 2 with various Sm and Y contents (from 2 to 30% at.), prepared by the High-pressure Field Assisted Rapid Sintering technique, in order to check for differences in their local and average structure with respect to conventional microcrystalline samples. Different grain sizes between 10 nm and 1 µm can be obtained by varying the densification conditions and will be measured for a detailed study of the relationship between grain size, dopant content, and conduction properties.

The experiment went very well from the very beginning: data collection was fast and reliable, and the local contact (Simon Kimber) was very helpful both in preparing data collection strategies and in advicing during data reduction and refinement.
All the samples planned could be measured in a very detailed way,