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Foreword

Grain boundary engineering of electronic ceramics

COST is a European programme promoting co-operating in science and technology. Today there are over 200 active COST networks (or so-called Actions) operating in 32 countries. Of these Actions, 12 are in the Materials sector.

In 1999, a new 6-year COST Action, 'Advanced Electroceramics—Grain Boundary Engineering' was established, and designated COST 525. The main objective of the COST-action was to understand the role played by grain boundaries in controlling the manufacture, microstructure and properties of electronic ceramics. The increase in knowledge should lead to materials with enhanced properties, improved stability, reduced unit cost of each component, and possibly new opportunities for existing and developing ceramics.

The specific objectives were:

(i) to understand the effect of processing on the microstructure, and how microstructural features control the properties;
(ii) to understand how to optimise the composition and microstructure of important electronic ceramics to yield improved properties;
(iii) to develop rules for the "engineering" of grain boundaries to control properties;
(iv) to engineer materials for efficient and reliable operation of electroceramic devices.

The programme focused on two families of ceramics and these represent the two Working Groups (WG) of COST 525:

(i) Ionic and mixed ionic-electronic conductors (WG1).
(ii) Dielectrics, sensors and semiconducting ceramics (WG2).

As well as materials-specific, collaborative projects the Action addressed the development of characterization techniques. Each year COST 525 held one or two Workshops and Working Group meetings. The papers in this volume are based upon presentations given at the final meeting of the COST525 Working Groups held in Portoroz, Slovenia in June 2005. The first group of papers deal with monolithic and thin film dielectrics, sensors and semiconducting ceramics; several of these papers focus on development and exploitation of characterization techniques. These are followed by a small group of papers on conducting ceramics, and finally four papers on multifunctional ceramics which emerged as an important theme in the final year of COST Action 525.

Full details of COST Domains and Actions may be found at www.cost.esf.org.

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