Preface

After the discovery of high temperature superconductivity ten years ago there was an explosion of worldwide interest in oxide superconductors. This resulted fast in the discovery of superconductivity above liquid nitrogen temperature in $YBa_2Cu_3O_{7-x}$ (123 phase) and later above 100 K in Bi–Ca–Sr–Cu–O, Tl–Ca–Ba–Cu–O and Hg–Ba–Ca–Cu–O systems. On the other hand, superconducting oxides without copper (Ba–K–Bi–O) were also investigated. The oxide systems mentioned above have thoroghly been studied and the different structures existing in these systems are now well known.

The research activity on superconductivity has, however, during the last years decreased because the applications were more difficult to achieve than expected. The focus of the studies has changed from the search of new phases to thin films and processing the materials for applications. In the search for practical use for the high temperature superconductors one has limited to the 123 material and its use as thin film in microwave applications, like resonators, filters and antennas.

The present issue of this Journal is devoted to thermoanalytical studies of high temperature superconductors and the most important topics of this area are described by twelve original scientific papers and four reviews written by well-known scientists. Thermoanalytical methods can be applied in various stages of preparation and characterization of the oxide superconductors. The most important topics studied by the most common TA methods (TG, DTA) are: thermal stability of precursors, formation of superconducting phase and analysis of oxygen stoichiometry. Thermal methods are also needed in the investigations of phase diagrams and thermodynamics of the superconductors. This issue contains papers on all aspects dealing with thermal analysis of superconductors. In review papers the emphasis is in thermodynamics and phase diagrams. Only one important area, viz. the thermoanalytical studies of volatile precursors for superconducting thin films is missing among the reviews.

Chemical vapor deposition is one of the most important method to prepare HTSC thin films and there the key issue is the use of pure, volatile and reactive precursors of the metallic constituents. In the microwave applications the conformal coating of the substrate is needed and conformality is the advantage of the CVD method compared to physical thin film deposition methods.

This special issue shows nicely how versatile tools the thermoanalytical methods are. The methods can be and are used in all steps of the preparation of these new materials. The oxide superconductors present a very complex material type especially what is to the stoichiometry concerned. Because the TA methods are valid in studies of HTSC materials they are applicable for most of the materials indicating a growing importance of TA methods in materials science and engineering.

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