

Material for Fuel Cells		
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Summary		
E1.III	<p>Major technological breakthroughs have still to be achieved to render fuel cell technology fully competitive. Solid materials are currently developed for Solid Oxide Fuel Cells (SOFC), Proton Conductor Fuel Cells (PCFC), Proton Exchange Membrane Fuel Cells (PEMFC) and Direct Methanol Fuel Cells (DMFC). Furthermore, any topic dealing with new types of Fuel Cells, such as Direct Carbon and Microbial Fuel Cells, etc., and alternative applications of Fuel Cells, such as CO₂ Capture with Fuel Cells are solicited. In SOFC research is going now in the direction of lower-temperature SOFC (<600°C) in order to decrease the materials cost, which will enable the use of metallic materials with better mechanical properties and thermal conductivity. Another possibility to reduce the operating temperature of fuel cells is the use of intermediate temperature inorganic proton conductors. Proton-conducting Fuel Cells (PCFC) use this kind of solids for operation at intermediate temperatures (typically below 600°C). PEM fuel cells are nowadays a credible alternative for environmentally friendly energy conversion, in electric vehicles and portable microelectronic applications, with hydrogen or methanol as fuel.</p> <p>Hot topics include development of higher performance polymer membranes, more effective electrode materials, and membrane-electrode assemblies (MEAs) with longer lifetime. The study of new and improved fuel cell electrodes and electrocatalysts is a major effort to be pursued to overcome mainly the electrode poisoning by impurities of hydrogen gas. The conversion efficiency of MEA depends on many factors including type and thickness of both membrane and gas-diffusion material, nature of binder used in the electrodes, the binder to catalyst ratio.</p>	

Summary	
E1.III	<ul style="list-style-type: none">○ Materials for SOFC, MCFC, PCFC, PEMFC and DMFC;○ Fuel cell reactions, thermodynamics and kinetics○ Oxide ion conductors○ Proton-conducting oxides○ Solid proton conductors○ Electrodes or interconnects of High Temperature Fuel Cells○ Electrode materials and electrocatalysts for Low Temperature Fuel Cells○ Membrane-electrode-assembly and fuel cell testing○ Cell and stack structures○ Modelling of materials and fuel cell performance○ Durability and degradation issues.