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Influence of Operating Conditions on Electrochemical Phenomena in Carbon Fuel Cell

A. Bologa, K. Aleksandrov, H.-J. Gehrmann, K. Woletz, D. Stapf
Institute for Technical Chemistry, Karlsruhe Institute of Technology, Eggenstein -Leopoldshafen, Germany

The study contributes to investigation of the influence of operation conditions on electrochemical phenomena in an experimental carbon fuel cell (CFC). The cell is heated inside an electric oven. The CFCl includes ceramic crucible with a cover, anode, cathode and reference electrode. An eutectic ternary carbonate salt mixture is used as electrolyte. The atmospheric air is purged through the CFC cruicble during the cell operation. The novelty of the study consists in use of Carbon Fibers (CF) as cell fuel. The reserach project involves the study of CFC electrodes' design, heating temperature, as well as, of the mass CF-fuel on exprimental cell parameters. The test facility periphery is applied for control of temporal evolution of temparture inside and outside the CFC curible, fuel cell voltage and current, as well as, of concentration of carbon dioxide in the output purged atmospheric air. The Light Microscopy and Laser Induced Plasma Spectroscopy are applied for analysis of the state of carbon fibers and CFC electrolyte after the short- and long-term tests. The results of the study allows better understanding of the electrochemical phenomena and their temporal evolution during the cell operation. In perspective, the research shoud be extended to the study of the phenomena, related to the direct conversion of Carbon Fibers Reinforced Polymers into electric power.

Biography:

Dr.-habil. Andrei Bologa is a scientist with over 40 years of experience in the field of charged aerosols, electrohydrodynamics, gas cleaning technologies, carbon fuel cells. His experience includes design, development and investigations of electrostatic precipitators for gas cleaning from waste, as well as, small scale biomass combustion, cleaning of exhaust gases from chemical industrial processes and machinery. The research interests cover also development of electrostatically augments condensation systems for pyrolysis processes, as well as, the design and investigation of carbon fuel cells. He is the author of over 250 publications and over 50 patents.