MICROGRAVITY SCIENCES AND PROCESSES SYMPOSIUM (A2)
Microgravity Experiments from Sub-Orbital to Orbital Platforms (3)

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MICROGRAVITY EFFECTS ON THE ELECTROCHEMICAL OXIDATION OF AMMONIA: A PARABOLIC FLIGHT EXPERIMENT

Abstract

The diffusion of molecular species through nanoporous systems in microgravity conditions is of interest due to the implications of nanotechnology in aerospace technologies. In this work we present the electrochemical oxidation of ammonia on Pt nanoparticles/nano-supporting electrode systems. The decomposition of ammonia has become of critical importance since it is a common component in aqueous streams and a by-product of processes, particularly aboard the International Space Station. The experiments were carried out utilizing a custom-made Electrochemical Microgravity Laboratory (EML) during parabolic flight aboard a Boeing 727-200 at the NASA Johnson Space Center in Houston TX USA. An average gravity of 0.006 g's was achieved for an average window of 14.5s in each of the 60 parabolas. In this campaign three different electrodes were used to test the microgravity effects on the electrochemical oxidation of the ammonia. The three electrodes employed were: (1) Electrodeposited platinum nanoparticles on a Glassy Carbon Electrode (Pt-GCE), (2) Hydrogen reduced platinum nanoparticles on Carbon Vulcan XC-72R (Pt-H2/C), and (3) Platinum nanoparticles on Carbon Vulcan XC-72R (Pt/C). Linear polarization curves were attained under microgravity for all materials and a reduction in catalytic performance of 20%-65% was observed.