

HIGH ENERGY CATHODES AND ANODES FOR MOLTEN SALT BATTERIES

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The objective of this research is the investigation of electrochemical and chemical processes that determine the operation of the Na/S(IV) cell in molten AlCl_3 -NaCl mixture.

Recent studies of laboratory cells have demonstrated long cycle life (1370 cycles for one of the cells), high energy densities (457 W h/kg, excluding the case and β'' -alumina tube), and high power densities (231 W/kg). Other research has included Raman spectroscopic studies of the positive compartment of a laboratory cell during charge/discharge, and polarization studies at the melt- β'' -alumina interface.

Further studies of cycle life, particularly of metal cells with the 'inside-out' configuration, will be conducted. We also plan to complete polarization studies and examine sulfur electrochemistry in 'room-temperature' molten chloroaluminates. Examination of used β'' -alumina tubes will be continued.

Recent publications

- 1 G. Mamantov, Molten salt electrolytes in secondary batteries, in D. W. Murphy, J. Broadhead and B. C. H. Steele (eds.), *Materials for Advanced Batteries*, Plenum Press, New York, 1980, pp. 111 - 122.
- 2 G. Mamantov, R. Marassi, M. Matsunaga *et al.*, The use of tetravalent sulfur in molten chloroaluminate secondary batteries, *J. Electrochem. Soc.*, 127 (1980) 2319.
- 3 G. Mamantov, V. Norvell, L. Klatt *et al.*, Spectro-electrochemical and other studies of sulfur and its halides in chloroaluminate melts: application to a new rechargeable high voltage low temperature cell, in G. Mamantov, M. Blander and G. P. Smith (eds.), *Proc. Third International Symposium on Molten Salts*, The Electrochemical Society, Inc., Pennington, NJ, 1981, pp. 158 - 166.
- 4 R. Marassi, D. Calanzio and G. Mamantov, Selenium(IV) cathode in molten chloroaluminates, in D. W. Murphy, J. Broadhead and B. C. H. Steele (eds.), *Materials for Advanced Batteries*, Plenum Press, New York, 1980, pp. 223 - 227.
- 5 V. E. Norvell, K. Tanemoto, G. Mamantov and L. Klatt, UV-visible and electron spin resonance spectro-electrochemical studies of sulfur oxidation in AlCl_3 -NaCl (63/37 mol%) melt, *J. Electrochem. Soc.*, 128 (1981) 1254.
- 6 K. Tanemoto, G. Mamantov, R. Marassi and G. M. Begun, Resonance raman and UV-visible spectral studies of iodine oxidation in chloroaluminate melts, *J. Inorg. Nucl. Chem.*, 43 (1981) 1779.
- 7 K. Tanemoto, R. Marassi, C. B. Mamantov *et al.*, Oxidation of sulfur in chloroaluminate melts of intermediate pCl, *J. Electrochem. Soc.*, in press.