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## Electrodeposition of Silicon using Hexafluorosilicate in Formamide and Dimethyl Formamide

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Support was through Project Emerald, Research Site for Educators in Chemistry, a National Science Foundation program administered by The University of New Mexico, Chemistry. This grant funded faculty, their students and equipment. The grant purchased a Terra Universal glove box and Pine Bipotentiostat. The students presented their work at the Emerald conference, August, 2000. Students worked on a GC project, and a poly aryl sulfone hydrogen ion conductor project in addition to the silicon project. Here we report only the silicon related work.



Don Garza (above left) continued working on ammonium hexafluorosilicate, AHFS, and tetramethyl ammonium hexafluorosilicate, TMAHFS, electrodepositions in formamide and dimethyl formamide, DMF. TMAHFS was synthesized by metathesis with fluorosilicic acid and tetramethyl ammonium hydroxide.



The samples were dried under vacuum. TMAHFS was found to be hygroscopic. It melted at 100 C (every attempt was made to exclude water). It decomposed at 240 C. The solubility in dimethyl formamide was 11% by mass (significantly higher than AHFS in DMF).

With the new potentiostat (Pine Bipotentiostat), CV scans and potential steps were performed with aluminum working electrode, silicon counter electrode, and platinum pseudo reference

electrode. In all cases, cathodic decomposition of DMF was seen to occur at 1.2 V vs Pt. No deposits were observed at the attainable potential of -1.1 V (cathodic) vs Pt. The decomposition of DMF was not observed with the previous two-electrode set ups performed in the summer of 1999. Formamide, and dimethyl formamide were abandoned as solvents for silicon electrodeposition using hexafluorosilicate salts.