

Research Enhancement Program Report  
*Topochemistry of Layered Selenide Materials*  
January 2004 – August 2004  
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### **Abstract**

This award has been invaluable as I built a new research program at Texas State University. These funds not only gave me the necessary resources to acquire supplies and encourage student involvement, but they also helped to secure external funding by ensuring that these resources would be available at the time this external grant would begin.

The research project detailed in the proposal centers on the low temperature modification of selenium-containing structures. Before such work may take place, the framework compounds must be synthesized from elements at high temperatures in a furnace. Since the compounds of interest contain highly reactive alkali metals, for safety these metals are pre-reacted with selenium to generate alkali selenide salts. Each step described above requires specialized glassware and equipment. During the term of this grant we converted the laboratory into a space suitable for solid state synthesis by building a high vacuum line, an inert gas line, and a bank of furnaces. We then synthesized and analyzed more than 60 products including a number of alkali chalcogenide salts, and the low dimensional structures  $\text{Cs}_6\text{Re}_6\text{S}_{12}$ ,  $\text{LiCrS}_2$ , and  $\text{KFeS}_2$ . These compounds, and the equipment purchased from this REP grant serve as the basis for the research proposal submitted to the Petroleum Research Fund, which was awarded beginning 9/1/2004.

40% of the funds were used to pay undergraduate students (Rick Gonzales, Ross Spann, and Roy Ouma) during the summer of 2004, and the remainder was used to buy specialized glassware, furnace supplies, electrochemical apparatus, and a license for the ICSD structural database.

### **Publications Resulting from this REP Award:**

None at this date.

### **Current External Support Resulting from this REP Award:**

Petroleum Research Fund (PRF) Grant # 41834-GB10  
“Topochemical Synthesis of New Layered Selenide Materials”  
9/1/2004 – 8/31/2006  
Total award: \$35,000