

NEXAFS Investigations of Transition Metal Phosphides

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Abstract No. Oyam9850

Beamline(s): U1A

Introduction: Transition metal phosphides are a new type of catalyst for hydroprocessing petroleum feedstocks. We have developed a method for preparing these materials at moderate temperatures and are studying their structure and electronic properties by NEXAFS spectroscopy.

Methods and Materials: The phosphides are prepared from phosphate precursors using a temperature-programmed method where the precursors are heated in a hydrogen stream. The samples are then passivated and studied in a catalytic reactor or by NEXAFS spectroscopy.

Results: Several materials have been successfully prepared. These include TiP, MoP, WP, Fe₂P, CoP, and Ni₂P. They have been found to have excellent activity in hydroprocessing a model feed containing dibenzothiophene and quinoline at realistic conditions. NEXAFS spectra have been taken of these compounds and the results are being analyzed.

Conclusions: Highly active catalytic materials have been prepared and studied by NEXAFS spectroscopy.

Acknowledgments: J.Chen, P. Clark, and X. Wang

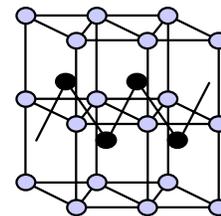


Figure 1. Typical phosphide structure with P chains