Roles of EXAFS and XRPD in Petrochemical Research

Jen-Ray Chang(張仁瑞)\textsuperscript{1}, Tzong-Bin Lin(林棕斌)\textsuperscript{2}

\textsuperscript{1}Department of Chemical Engineering, National Chung Cheng University, Chia-Yi, Taiwan
\textsuperscript{2}CPC Corporation, Taiwan, RMRI, Chia-Yi, Taiwan
\texttt{\textsuperscript{1}chmjrc@ccu.edu.tw}
\texttt{\textsuperscript{2}077097@cpc.com.tw}

Abstract

EXAFS and XRPD provide the most precise structure data characterizing catalysts used in petrochemical. In this presentation, two examples regarding catalyst development by the use of these two techniques, thereby developing new chemical process will be demonstrated.

The 1\textsuperscript{st} example is an invention of a process for production of aliphatic esters by the reaction of the corresponding alcohol. The preferred catalyst is Pd-Pt/HY. Since EXAFS prove the existence of Pd-Pt bimetallic interactions, the superior catalytic properties in high stability maintenance of the catalyst to others were suggested to be caused by bimetallic interaction inhibiting metal aggregation.

The 2\textsuperscript{nd} example demonstrates the merits of V\textsubscript{2}O\textsubscript{5}/TiO\textsubscript{2}-SiO\textsubscript{2} catalyst as opposed to conventional V\textsubscript{2}O\textsubscript{5}/TiO\textsubscript{2} catalyst used in the catalytic conversion of \(\beta\)-picoline to nicotinic acid. The main advantage of TiO\textsubscript{2}-SiO\textsubscript{2} support is its higher surface area, as compared to TiO\textsubscript{2}, hence, more vanadia active sites can be accommodated on support. Moreover, EXAFS and XRPD confirm the formation of V\textsubscript{2}O\textsubscript{5}-TiO\textsubscript{2} interactions leading to higher partial oxidation selectivity.

Keywords – EXAFS, XRPD, ester production, nicotinic acid, bimetallic interactions.

Reference