Mechanisms of reduction in V_2O_5 and MoO_3 studied by PAC spectroscopy

A. Burimova[1], A. W. Carbonari[1], D. Richard[2], L. F. Dias Pereira[1], F. A. Genezini[1]

[1] *Centro de Reator de Pesquisas, Instituto de Pesquisas Energéticas e Nucleares, 2242 Professor Lineu Prestes ave., Cidade Universitária, CEP 05508-000, São Paulo, SP, Brazil*
[1] *Departamento de Física, Universidad Nacional de La Plata, Casilla de Correo 67, 1900 La Plata, Argentina*

E-mail: anstburimova@gmail.com

Structural evolution of vanadium (V) and molybdenum (VI) oxides with temperature was studied by Time Differential Perturbed Angular Correlation (TDPAC) spectroscopy in different atmospheres with ^{111}Cd probe incorporated by wet impregnation. In case of V_2O_5 sealed in vacuum, the critical temperature for probe diffusion was found to be above 500ºC, whereas for MoO_3 this barrier was 600ºC. The diffusion was suppressed in low pressure oxygen atmosphere. The behavior of hyperfine parameters on heating to melting point of V and Mo oxides and subsequent cooling to room temperature was analyzed. TDPAC results were complemented by X-ray diffraction data. We discuss comproportionation, topotactic, competitive and consecutive mechanisms as the candidates to describe $V_2O_5 \rightarrow VO_2$ and $MoO_3 \rightarrow MoO_2$ reduction.