Combined TDPAC and EXAFS Study of InPt/FER Catalysts

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Time Differential Perturbed Angular Correlation (TDPAC) experiments using ^{111}In as probe were performed in order to determine the nature of In-sites in In-ferrierite (In/FER), before and after the incorporation of Pt through the hyperfine interaction between the nuclear quadrupole moment of the probe's nucleus and the extranuclear electric field gradient (EFG). Extended X-ray Absorption Fine Structure (EXAFS) measurements were performed to measure the absorbance above the Pt's L_{III} absorption edge in the transmission mode in order to determine the local environment of Pt atoms in Pt/FER and InPt/FER catalysts.

TDPAC spectra of ^{111}In in In/FER and InPt/FER taken at 500°C in air indicated that there are no changes in the indium surroundings after the incorporation of Pt. Three sites were found for indium in both samples. Two of them correspond to the two sites of indium in In_2O_3 and the third one is attributed to In in exchange sites of the zeolites. Their population, quadrupole frequencies and asymmetry parameters didn't change with the incorporation of Pt. EXAFS experiments showed similar near neighborhood Pt-O distances and Pt coordination number in Pt/FER and InPt/FER samples. There is no evidence of the presence of any In-Pt bimetallic entity in InPt/FER catalyst.

Key words: Hyperfine Interactions; TDPAC; EXAFS; Catalysis; Ferrierite.