

## **Combined X-ray absorption and X-ray powder diffraction study on silver cluster formation in zeolites; effect of pore geometry and addition of copper.**

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Adding hydrogen to the selective catalytic reduction (SCR) hydrocarbons (HC) deNO<sub>x</sub> process over silver systems leads to enhanced activity. This has been ascribed to the formation of silver nano clusters. Subsequent treatment in NO disperses the metal clusters through oxidation to silver(I). The reversibility of the valence states with the formation of clusters in both systems is significant part of the overall mechanism for reducing NO<sub>x</sub>. The silver environments in the two microporous systems Ag:ZSM-5 and Ag:Y have been studied by *in situ* X-ray Absorption spectroscopy (XAS) at the Ag K-edge. Samples were heated stepwise in hydrogen while collecting Extended X-ray Absorption Fine Structure (EXAFS), powder diffraction (XRD) to determine the cluster size as a function of temperature. The EXAFS yields information about the local environment of silver such as bond distances and number of neighbours. Silver(I) is reduced to form clusters of metallic silver by hydrogen, but the degree of reduction depends highly on the parent zeolite and the addition of copper to the system.