

## **Study of Nanoparticle Formation in Zeolites Using Simultaneous Pair Distribution Function & Infrared Spectroscopy Measurements**

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Simultaneous pair distribution function (PDF) analysis and diffuse reflectance infrared spectroscopy (DRIFTS) measurements were used to study the mechanism of Ag cluster formation within Ag<sup>+</sup> exchanged zeolites (A, Y, Mordenite) under reducing or inert atmospheres. The simultaneous in-situ PDF/DRIFTS measurement provides both fast time resolution for the structural changes and insights into the zeolite surface chemistry. PDF/DRIFTS measurements were further combined with data from X-ray Absorption Near Edge Spectroscopy (XANES), which provided insight into the oxidation state changes of the Ag. Measurements were able to both disentangle the role of water and hydroxyl functionalities on the process of particle formation, and decipher how the variation in zeolite pore structures influence the Ag particle formation and dehydration processes.

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