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Composition dependent reduction of size-selected CoPt bimetallic clusters on Al2O3 thin film BING YANG, ERIC TYO, SOENKE SEIFERT, Argonne National Laboratory, Argonne, IL, USA, GHASSAN KHADRA, JULIETTE TUAILLON, VERONIQUE DUPUIS, University Lyon & CNRS, Villeurbanne cedex, France, STEFAN VAJDA, Argonne National Laboratory, Argonne, IL, USA; Yale University, New Haven, Ct, USA — Atomic ratio in CoPt bimetallic nanoparticles has a great impact on tailoring the oxidation state and catalytic performance of supported CoPt catalysts. Here, we produced size-selected CoPt bimetallic clusters with atomic precision in both size and composition, soft-landed on alumina thin films. Upon landing, an immediate oxidation of Co is observed and aging in air leads to further oxidation of both Co and Pt as characterized by XPS. In-situ grazing incidence X-ray Absorption Spectroscopy and Small Angle Scattering was performed to monitor the oxidation state, and the size and shape of the catalyst under reducing conditions, respectively. A strong composition dependent behavior is observed in the reduction of the two metallic components. Co reduction in CoPt cluster occurs at 65oC, while the reduction of other clusters (Co3Pt, Co, CoPt3) shifts to higher temperature range (105°C-225°C). Pt in all Pt containing clusters (Pt, CoPt3, CoPt and Co3Pt) compositions was reduced already at 25°C. Our results open up the possibility to tune the physical/chemical properties of nanoscale matter by precise control of their atomic ratio.

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