Abstract Submitted
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Supported Single Atoms Mediate Catalytic Reactions[1] JINGYUE LIU, Arizona State University — Isolated single metal atoms dispersed on high-surface-area supports have recently demonstrated remarkable activity and selectivity for a variety of catalytic reactions. The interaction of the individual metal atoms with the support surface modifies the surface electronic structure of the metal-support ensembles and thus tunes the binding strength of the reactant molecules. Such an approach to engineering the surface electronic structure of high-surface-area support materials can be effectively utilized for developing new and better catalysts. The realization of atomically dispersed, supported metal catalysts, especially noble metal catalysts, is not only of fundamental interest but also opens new routes to significantly reduce the cost of practical catalysts for a plethora of important chemical transformations. The challenges in developing practical single atom catalysts (SACs) include a) robust synthesis of SACs with high levels of metal loading and b) stabilization of isolated single atoms during catalysis. Anchoring of the isolated single metal atoms onto the surfaces of the supports is therefore critical. Aberration-corrected electron microscopy techniques prove to be invaluable for unambiguously identifying the location of the isolated single metal atoms and the surface atomic structure of the supports. The fundamental physics of the electron transfer processes between the deposited single metal atoms and the support surfaces is still not fully understood.

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