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Cu/CuOx Nanoclusters on ZnO(1010): Electronic, Catalytic, Morphological Structure ZIYU ZHANG, MATTHEW PATTERSON, MAOMING REN, YAROSLAV LOSOVYI, JOHN FLAKE, RICHARD KURTZ, PHILLIP SPRUNGER, Louisiana State University — ARUPS, STM, and EELS has been used to study the electronic, atomic and chemical structure of Cu and CuO nanoclusters on non-polar ZnO(1010) surface. Within the backdrop of developing high performance CO2 reduction catalyst (methanol production), our studies show that higher yield rate are found for Cu(I) surface species. ARPUS results from nanocluster CuOx/ZnO reveals that the oxidation process is highly dependent on the cluster size (smaller size. Moreover, CO adsorption (BE and vibrational) are distinctly different between Cu and CuOx nanoclusters supported on ZnO. Reaction studies confirm that methanol production is 4 times higher on partially oxidized Cu nanoclusters. Photoemission shows a small amount of Cu(II) even upon repeated oxidation/annealing processes, indicating a preferential stability of Cu(I) in the supported nanoclusters, due to interfacial effects with the substrate. This talk will include results from EELS/TPD and STM/AFM studies to better elucidate the chemical adsorption and intermediates as a function of CuOx size and structure.

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