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Cu/CuOx Nanoclusters on ZnO(1010): Electronic, Catalytic, Morphological Structure[1] ZIYU ZHANG, FEI WANG, Dept. of Physics, Louisiana State University, MAOMIN REN, Dept. of Chemical Engineering, Louisiana State University, FRANK WOMACK, Dept. of Physics, Louisiana State University, MINH LE, Dept. of Chemical Engineering, Louisiana State University, YAROSLAV LOSOVYI, CAMD, Louisiana State University, RICHARD KURTZ, PHIL SPRUNGER, Dept. of Physics, Louisiana State University, JOHN FLAKE, Dept. of Chemical Engineering, Louisiana State University — To develop a high performance catalyst for CO2 reduction, we tried bi-layers based on CuOx (x=0, 1, 2) and ZnO. The highest yield rate is found for Cu(I) on ZnO. The repeatability of the experiment illustrates that the Cu(I) catalytic clusters are stable in the air, due to the interface of the bilayer.STM and ARPUS results reveal that the preparation process are highly dependent on the annealing temperature and cluster size. EELS and UPS data show that CO adsorption is distinctly different between Cu and CuOx clusters on ZnO, which explains the different yield rate. Based on TDS and EELS of adsorption such as CO2, H2O, combined with DFT calculation, the mechanism of methanol synthesis is given by introducing intermediate products.

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