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Synthesis and Characterization of Mesoporous Molybdenum Oxide

The objective of this project was to synthesize mesoporous molybdenum oxide using an inverted micelle approach. In this work, a “one-pot” synthetic approach was developed for the synthesis of mesoporous molybdenum oxide (MoO_3). Two different MoO_3 precursors were explored. Mesoporous MoO_3 synthesis starting with ammonium molybdate tetrahydrate was unsuccessful; it is insoluble at the low water levels typically used for the one-pot approach and did not react when water levels were increased to improve solubility. Experiments using molybdenum (V) chloride were more promising. By adjusting the solvent system used for the one pot synthesis to a mixture of methanol and butanol, MoO_3 was successfully synthesized, though further analysis is needed to determine if the material is mesoporous. Thermal gravimetric analysis (TGA) and Temperature-programmed desorption (TPD) will be used to determine the evaporation rate of nitrate and the surfactant and to monitor the removal of the nitrate and carboxyl groups, respectively. If the material is mesoporous, it will be studied as a gas sensing material.