ABSTRACT

Metal-Organic Framework (MOF) is an organic-inorganic hybrid crystal that consists of metal cations and organic ligands with nanoscale pores. MOF has great advantages with high selectivity and sensitivity, high surface area, porosity, and tunable pore sizes. The aim of this final project is to characterize the electrical properties of five types of Metal-Organic Framework (MOF) exposure to CO_2 namely HKUST-1, ANZ (Activated Natural Zeolite), MIL-100(Fe), 20% ANZ@MIL- 100(Fe), and 98% ANZ@HKUST-1. This final project is in collaboration with Dr. Witri Wahyu Lestari from the Department of Chemistry, UNS, who has prepared samples for the characterization of electrical properties. The fabricated MOF samples were deposited on a semiconducting SiO_2 substrate and used silver paste for the electrodes. All measurements of the electrical properties were carried out in a closed test chamber to minimize the environmental effect and the CO_2 leakage. The characterization of the electrical properties of MOF observed the changes in current and resistance when the voltage was varied from -5 to 5 volt, the temperature was heat up to 230, and the CO_2 variation rate were 2.5, 5, 7.5, and 10 L/min. The I-V measurement shows that all MOFs are semiconductor. The best working temperature of the MOF is at 150^oC. The effect of temperature increases the current in the MOF. MOF has response to resistance changes when operating at room temperature. Based on the response sample when gas on and gas off and the ability to respond at room temperature, MOF has potential as an active material to detect the presence of CO_2.

Keywords: CO_2, Metal Organic Framework, electrical properties