ABSTRACT

Major: Chemistry   Poster

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Exploring UiO-66 and UiO-67 Metal-Organic Frameworks as Vehicles for Chemical Warfare Agent Sensors.

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Volatile organic molecules, specifically nerve agents, are the deadliest chemical warfare agents (CWAs) used in terrorist attacks. It is crucial that nerve agents be rapidly detected with high sensitivity. For legal reasons, benign analogs that mimic CWAs are used for research purposes. Carbon dots (CDs) are spherical nanoparticles made from molecules of carbon precursors. Due to their fluorescent properties, CDs are applicable as visual sensors of CNAs. However, CDs do not be able to absorb a significant amount of gaseous CWA from the environment. Metal-organic frameworks (MOFs) are porous, high surface area materials consisting of alternating metal-ion clusters and organic linkers. UIO-67 is a Zr-based MOF and is an excellent candidate for the suspension of thioacetone carbon dots for the detection of chemical nerve agents. The larger pores in UiO-67 are desired so that carbon dots can be suspended in the matrix without clogging the surface pores. In this work, we explored synthetic methodologies and determined the surface area and pore size distribution of UiO-67 MOFs that would be suitable for CD encapsulation.