



INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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Thesis Title: Fluorescence Based Detection of Environmental and Biological Threats by Functionalized Aqua-Stable Metal-Organic Frameworks

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SHORT ABSTRACT

Metal–organic frameworks (MOFs) are actually open, crystalline coordination architectures with porous nature. Beside gas storage and separation, catalysis, proton conduction etc., MOFs recently have become a very hot topic in the area of chemical sensing. Diverse types of chemical functionalities have been carefully and rationally implanted into the framework of MOFs, which bring interesting properties to the material. MOFs with wide variety of fluorometric detection properties have been developed so far. For detection of environmental toxin and biomolecules, the detection study must be performed in aqueous medium to maintain the real environment. But, the preparation of aqua stable MOFs having great selectivity and sensitivity towards the targeted analyte is still a difficult job in the field of research. The work represented in this thesis emphasizes on the design, synthesis, characterization of aqua stable MOFs and thorough sensing study of environmental and biological threats. For this purpose, metal ions with higher oxidation states (i.e. Al(III), Zr(IV), etc.) and carboxylic acid ligands (i.e. terephthalic acid, isophthalic acid, etc.) were employed for the construction of the super aqua stable MOFs (i.e. CAU-10, MIL-53 and UiO-66). The frameworks were judiciously functionalized by particular functionality with the specially functionalized ligand or by post-synthetic modification. The specific functionalities act as recognition sites for the targeted analytes. Hence, basically site-specific detection of environmental toxin and biological compounds are demonstrated the thesis.