# ABSTRACT

Metal Organic Frameworks (MOFs) have widely been used for various applications such as gas storage, purification and separation, catalysis, and sensing applications. Their application for water purification by removing heavy metal ions is hindered due to structural instability and non-reusability upon prolonged exposure to water. We have tried to explore the idea of doping Copper MOFs with Iron and Nickel as metallic centres in the crystal structure to improve structural stability and provide robustness for applications involving exposure to water. The characterization of synthesized particles was done using X-Ray Diffraction, Scanning Electron Microscopy, Energy Dispersive X-Ray Spectroscopy, FTIR, and ICP-OES. The simple pre-synthesis precursor addition technique with solvothermal approach was found to be effective in doping and doped variants showed similar XRD and FTIR characteristics as the undoped variant. The dopants were also found to be widely dispersed throughout the frameworks and morphological structure of the doped variants depends on coordination number of the dopants and their doping levels. Dissolution studies in water were performed to study the changes in structural stability and adsorption studies from 500 ppm Pb(II) ion solutions were done to find the efficiency of ion adsorption. These tests revealed that doping with metal ions having higher charge density is an effective way to improve structural stability. It is also found that the morphology of MOFs plays an important role in adsorption. Further studies can be done to tune the doping percentage for better stability and study reusability for economic application.