

## ABSTRACT

In this research project, Sonochemically assisted synthesis of 2D copper-formate metal-organic framework was executed. Copper-formate metal-organic framework was synthesized by self-assembly of  $\text{Cu}^{2+}$  with formic acid that was generated by the hydrolysis of N,N-Dimethyl formamide (DMF) under a sonochemical milieu. The structure and porous nature of MOF were confirmed by single crystal XRD analysis. This 2D MOF was used as host material for the incorporation of luminescent active guest (Quantum Dots) molecules to generate QD@MOF composite materials. The “*bottle around the ship*” and “*conventional stirring method*” were used to synthesize GQD@MOF composites. The QD@MOF composites were later confirmed by UV-visible spectroscopy, FTIR spectroscopy, photoluminescence spectroscopy in physical properties. Applications of GQD@MOF composite as chemosensing agent and photocatalyst was explored against various potent explosive compounds and water pollutants.