## Abstract

Metal-Organic Frameworks (MOFs) are crystalline porous materials that are constructed through the association of metal nodes and organic linkers. They are favorable targets in the electrocatalysts in energy conversion reactions due to their exceptionally high surface area, tunable structures, and dense active sites. As we all known, one of biggest challenge in today's world is a need of renewable energy. Researchers in renewable energy are working hard to develop better electrocatalysts for breaking down water into hydrogen and oxygen. This process, known as water splitting, is crucial for creating sustainable energy solutions. The intrinsic OER activity influenced by factors such as morphology and active sites distribution, can be enhanced through appropriate synthesis conditions. In this work, a copper-based MOF is synthesized from solvothermal approach under controlled conditions and evaluate its electrochemical performance for OER and HER (bifunctional catalyst). The synthesized samples were analyzed by several different methods, such as FTIR, thermal analysis, SEM, and XRD, to determine their structure, thermal stability, morphology, and crystallinity after synthesis. Their elemental analysis and morphology were confirmed through SEM-EDX. The FTIR data indicates the shifting of $COO^-$ band. This shift proves that the carboxylate groups are coordinated to $Cu^{2+}$ , confirming MOF formation. Electrochemical tests showed that the Cu-MOF possesses excellent catalytic activity for OER and HER, indicating that it is a promising low-cost electrocatalyst for water electrolysis.