Stable Metal-Organic Frameworks-based Materials for Electrochemical Applications

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Given several advantages of metal-organic frameworks (MOFs) including regular porosity, ultrahigh specific surface area, and periodic intra-framework functionality, MOFs have been served as the porous supports and utilized in a range of applications. Among various MOFs, zirconium-based MOFs (Zr-MOFs) are generally water-stable, which opens the opportunity of utilizing these MOFs in various applications needing to be operated in aqueous media. However, the electrically insulating nature of these MOFs limits their use in electrochemical applications. In this talk, various strategies that render the use of Zr-MOFs for electrochemical applications will be highlighted, including the utilization of redox hopping pathway in Zr-MOFs, the design of electrically conducting Zr-MOFs, and the harnessing of Zr-MOF-based nanocomposites. With the improved charge-transport rate and a high density of accessible active sites supported by the highly porous Zr-MOFs, the resulting MOF materials reveal promising performances in a range of electrochemical applications including charge storage, electroanalysis, and electrocatalysis