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Synthesis of MOFs@COFs porous hybrid materials via aza-Diels-Alder reaction towards high performance supercapacitors

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Metal-organic frameworks (MOFs) and covalent organic frameworks (COFs) attracted enormous attention in recent years. The growing interest in MOF@COF hybrid materials, which contain the structural traits and combine the merits of individual components and allow the generation of materials with unprecedented physicochemical properties and hold great potential in various applications. Herein, for the first time, by employing an aza-Diels-Alder cycloaddition reaction as postsynthetic modification (PSM) of MOF@COF-LZU1, we facile approach towards aza-MOFs@COFs hybrid porous materials with extended π-delocalization. Moreover, as a proof-of-concept the obtained aza-MOFs@COFs is used as a supercapacitor electrode and exhibits specific capacitance of 20.35 μF cm^{-2} and high volumetric energy density of 1.16 F cm^{-3}. Our approach of PSM of MOFs@COFs hybrids implement rational design for the synthesis of functional porous materials and expands the plethora of promising application of MOFs@COFs hybrid porous materials in energy storage applications.

References

Haijun Peng, J. Raya, F. Richard, W. Baaziz, O. Ersen, A. Ciesielski, P. Samorì, "Synthesis of Robust MOFs@COFs Porous Hybrid Materials via an Aza-Diels–Alder Reaction: Towards High-Performance Supercapacitor Materials", Angew. Chem. Int. Ed., 2020, 59, 19602–19609.

Figures

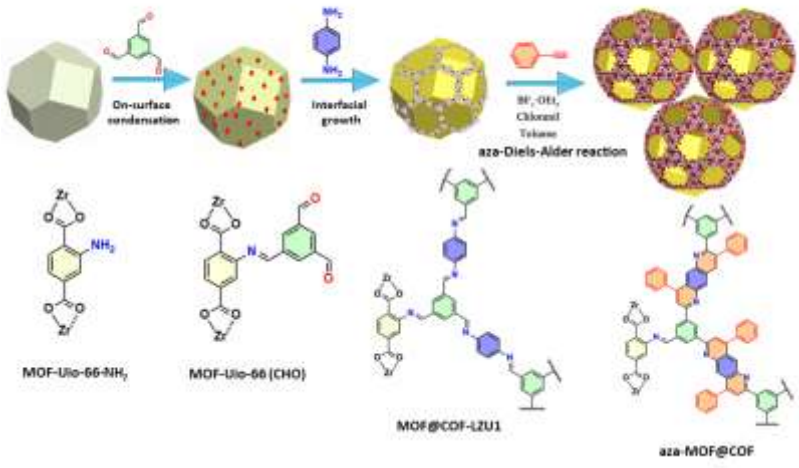

Figure 1: Schematic illustration of the synthetic route of aza-MOF@COF hybrid structure.