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Covalent Organic Frameworks for pollutant removal from water

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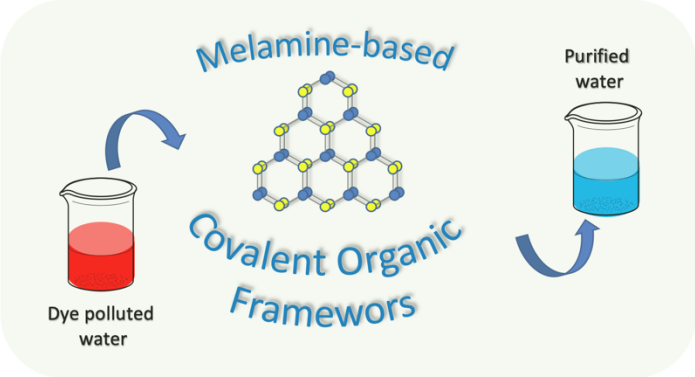
The occurrence of emerging pollutants in water bodies is an increasingly concerning problem in present-day society. Thus, it is crucial tackle this issue by devising systems and materials able to remove such pollutants from water. Among the various classes of materials that can be used to this aim, in recent years Covalent Organic Frameworks (COFs) have sparked increasing interest due to their convenient properties. COFs are solids constituted by an extended network of covalent bonds, obtained by reactions of suitably functionalized monomers.[1] Such covalent bond networks endow these materials with crystallinity and permanent porosity, akin to zeolitic structures. The ensuing regularly sized cavities can include guest species, making such materials suitable to act as efficient sorbents.[2] In this context, we have prepared and characterized three melamine-based COFs and used them as sorbent for removing model pollutants as dyes, from water solutions.



We characterized the materials for their morphology by SEM investigations and for their surface area by Brunauer–Emmett–Teller (BET) analysis, while thermal stability was probed by TGA. We then investigated the ability of the COFs to remove cationic and anionic dyes from aqueous solutions, also containing dyes in mixture. The kinetics and the mechanism of the adsorption process were investigated. Results obtained showed thorough and fast removal of the dyes considered. Finally, we evaluated the possibility of reusing and regenerating the spent sorbent.

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2. Z. Xia, Y. Zhao, S. B. Darling, *Adv. Mater. Interfaces*, **2021,** 8, 2001507.