

## Construction of highly crystalline ultraporous covalent organic frameworks in seconds

Suvendu Karak<sup>1</sup>, Rahul Banerjee<sup>1</sup><sup>1</sup>Physical And Materials Chemistry Division, National Chemical Laboratory, Pune, India

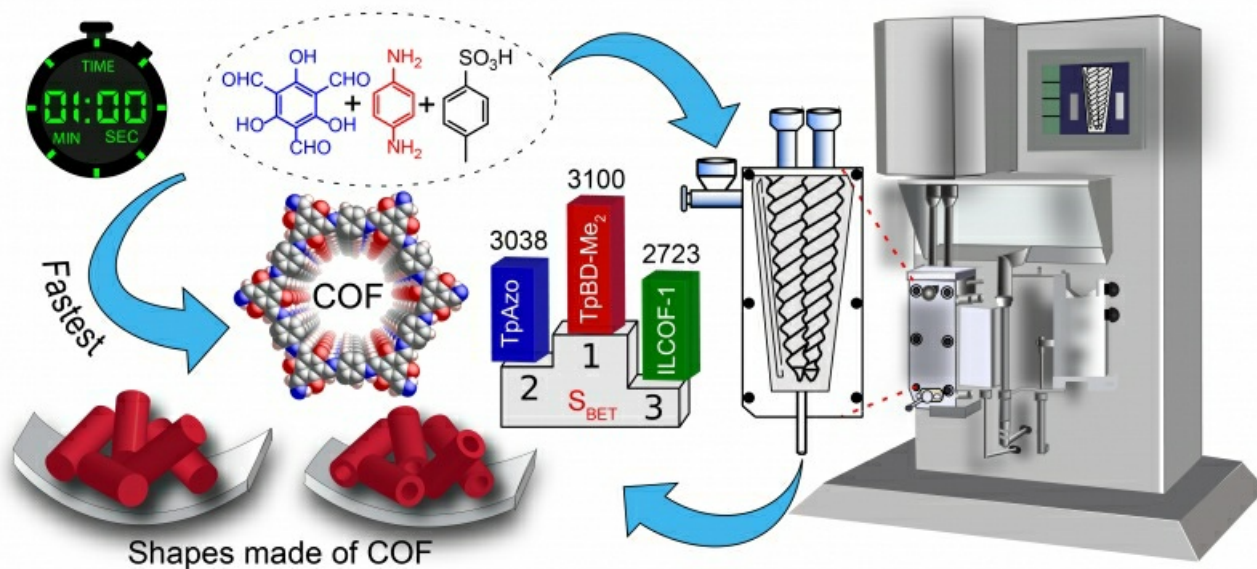
E-mail: s.karak@ncl.res.in

Covalent organic frameworks (COFs) have concerned substantial deal of recognition to the researchers because of its summoned inordinate scientific attention owing to its diverse applications such as catalysis, gas storage, sensing and optoelectronics. The conventional synthetic route for obtaining such ordered covalent networks is the connection of symmetrical building blocks through covalent bonds. However, tedious synthetic procedures, longer reaction time combined with the usage of toxic solvents and poor yield appears to be the bottleneck towards their greener fabrication, thereby limiting their possible potential applications. In this regard, we have introduced the simplest route via molecular organization approach towards the exceptionally rapid synthesis of highly crystalline, ultraporous COFs in seconds. The as-synthesized COFs ranked at the top among all reported two-dimensional COFs in terms of BET surface area till date. Accounting crystallography, we have detailed the molecular level fundamentals of COF crystallization and control over layered planarity and interlayer stacking. In addition, processing such porous, crystalline materials into various geometric shapes of industrial importance faces inadequacy due to the intricate problems like insolubility, grain boundaries as well as the difficulties in bulk scale synthesis. In this regard, we have further explored the possibility of industrial-scale (kg/h) synthesis of COFs and in situ processing them into different shapes (beads, cylinders, tube etc.) and sculpture mimicking the Terracotta Process by keeping their potentiality intact. The shapes outperformed the conventional zeolites and other MOFs in dehumidification performance.

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