# RETICULATION OF MACROMOLECULES INTO CRYSTALLINE NETWORKS

Tech ID: 30605 / UC Case 2020-030-0

## PATENT STATUS

| Country | Type | Number | Dated | Case |
|---|---|---|---|---|
| United States Of America | Issued Patent | 11,858,814 | 01/02/2024 | 2020-030 |

## BRIEF DESCRIPTION

Covalent organic frameworks (COFs) are 2D or 3D extended periodic networks assembled from symmetric, shape persistent molecular 5 building blocks through strong, directional bonds. Traditional COF growth strategies heavily rely on reversible condensation reactions that guide the reticulation toward a desired thermodynamic equilibrium structure. The requirement for dynamic error correction, however, limits the choice of building blocks and thus the associated mechanical and electronic properties imbued within the periodic lattice of the COF.

UC Berkeley researchers have demonstrated the growth of crystalline 2D COFs from a polydisperse macromolecule derived from single-layer graphene, bottom-up synthesized quasi one-dimensional (1D) graphene nanoribbons (GNRs). X-ray scattering and transmission electron microscopy revealed that 2D sheets of GNR-COFs self-assembled at a liquid-l quid interface stack parallel to the layer boundary and exhibit an orthotropic crystal packing. Liquid-phase exfoliation of multilayer GNR-COF crystals gave access to large area bilayer and trilayer cGNR-COF films. The functional integration of extended 1D materials into crystalline COFs greatly expands the structural complexity and the scope of mechanical and physical materials properties.

## SUGGESTED USES

» high performance electronic devices

## ADVANTAGES

» increased mechanical and electronic properties due to increased choices for building blocks within the COFs

## ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Precision Graphene Nanoribbon Wires for Molecular Electronics Sensing and Switch
- Automated Tip Conditioning ML-Based Software For Scanning Tunneling Spectroscopy

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## INVENTORS

» Fischer, Felix Raoul

## OTHER INFORMATION

**KEYWORDS**

COFs, organic frameworks, semiconductor

**CATEGORIZED AS**

» **Computer**
» Hardware
» **Materials & Chemicals**
» Thin Films
» **Semiconductors**
» Materials

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