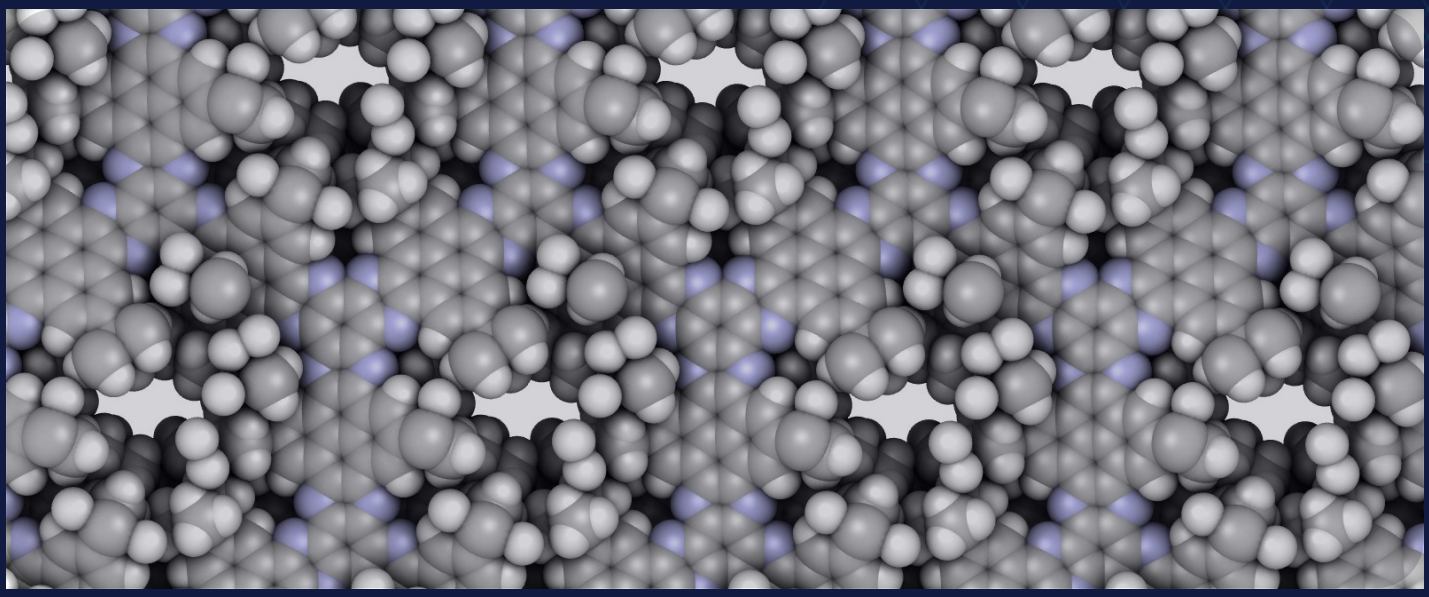
FantastiCOF

European Innovation Council

PROJECT NAME / FantastiCOF

FABRICATING AND IMPLEMENTING EXOTIC MATERIALS

FROM COVALENT ORGANIC FRAMEWORKS



THE PROJECT VISION

FantastiCOF is developing a disruptive route to highly crystalline, exotic moiré materials made from two-dimensional covalent organic frameworks.

PROGRAMME	PERIOD	EU CONTRIBUTION	COORDINATOR
EIC Pathfinder	Nov 2022 - Jul 2026	EUR 2.38 million	UPV/EHU, Spain

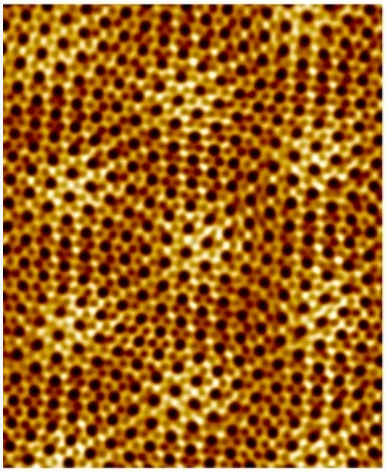
A HIGH-RISK / HIGH-GAIN PATH

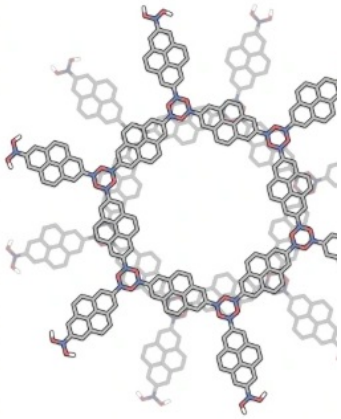
The goal is to create low-noise Josephson-junction devices and enable a new generation of superconducting electronics with enhanced performance and sensitivity.

PROJECT RESEARCH HIGHLIGHT

TWISTED 2D COFs

Building moiré superlattices from the bottom up





A lattice beyond the lattice

Stacking two porous organic sheets with a controlled rotation generates a larger periodic moiré pattern - a new structural design variable for organic materials.

~9.2°	predominant twist angle
~12.5 nm	representative moiré period

HOW THE CONCEPT WORKS

01
DESIGN
Molecular building blocks define the porous 2D lattice.

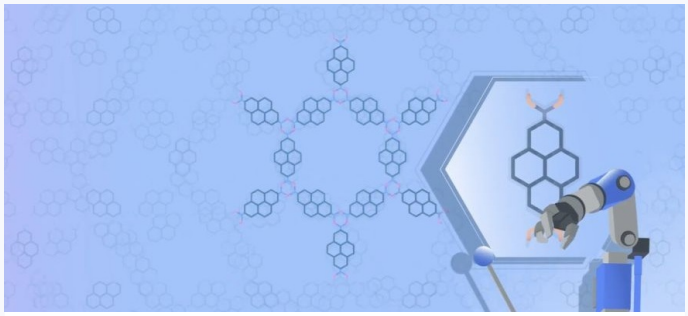
02
GROW
Reversible chemistry enables crystalline on-surface networks.

03
STACK
Interlayer interactions guide formation of a second sheet.

04
TWIST
Rotational offset creates the long-range superlattice.

FROM MOLECULES...

Covalent chemistry assembles repeat units into a porous, ordered sheet.



...TO TWISTED BILAYERS

Layer rotation and coupling produce emergent periodic structure.

WHY THIS MATTERS FOR FantastiCOF

Controlling lattice, twist and interlayer coupling creates a pathway to tune pore geometry and electronic behaviour - capabilities central to exploring future superconducting devices.