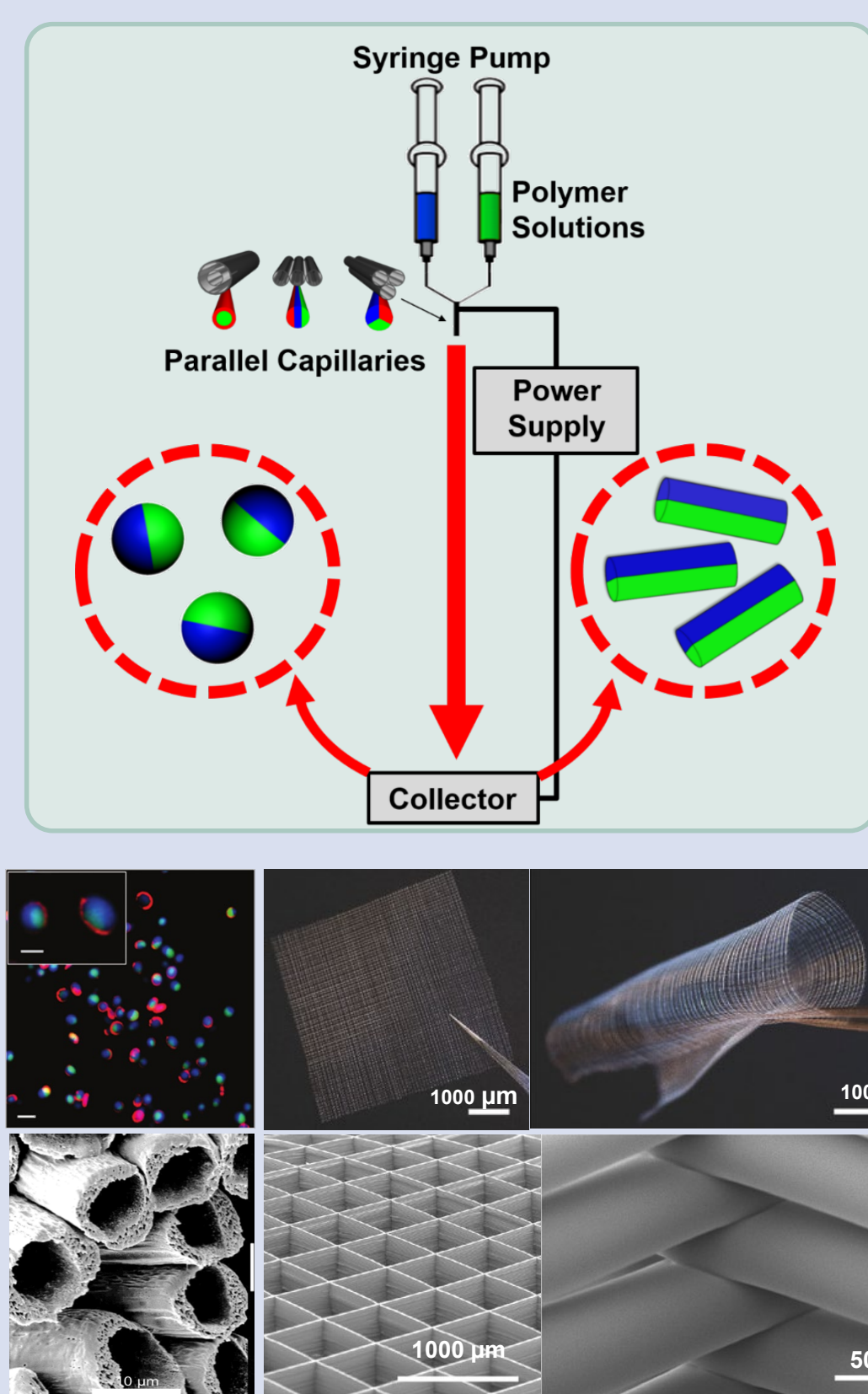


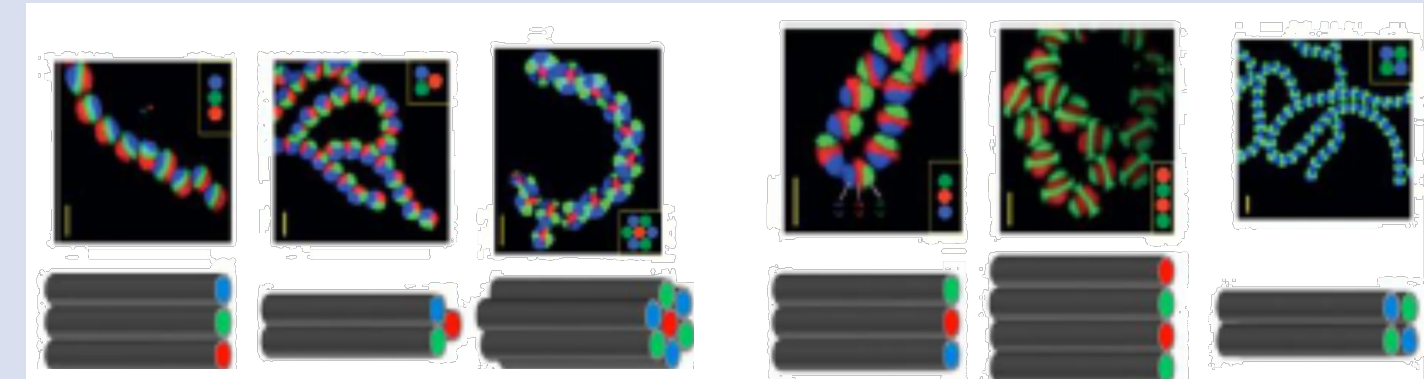
Advanced Polymer Materials

Katharina Cu, Bahar Dadfar, Safoura Vaez, Marvin Klaiber, Meike Koenig, Joerg Lahann

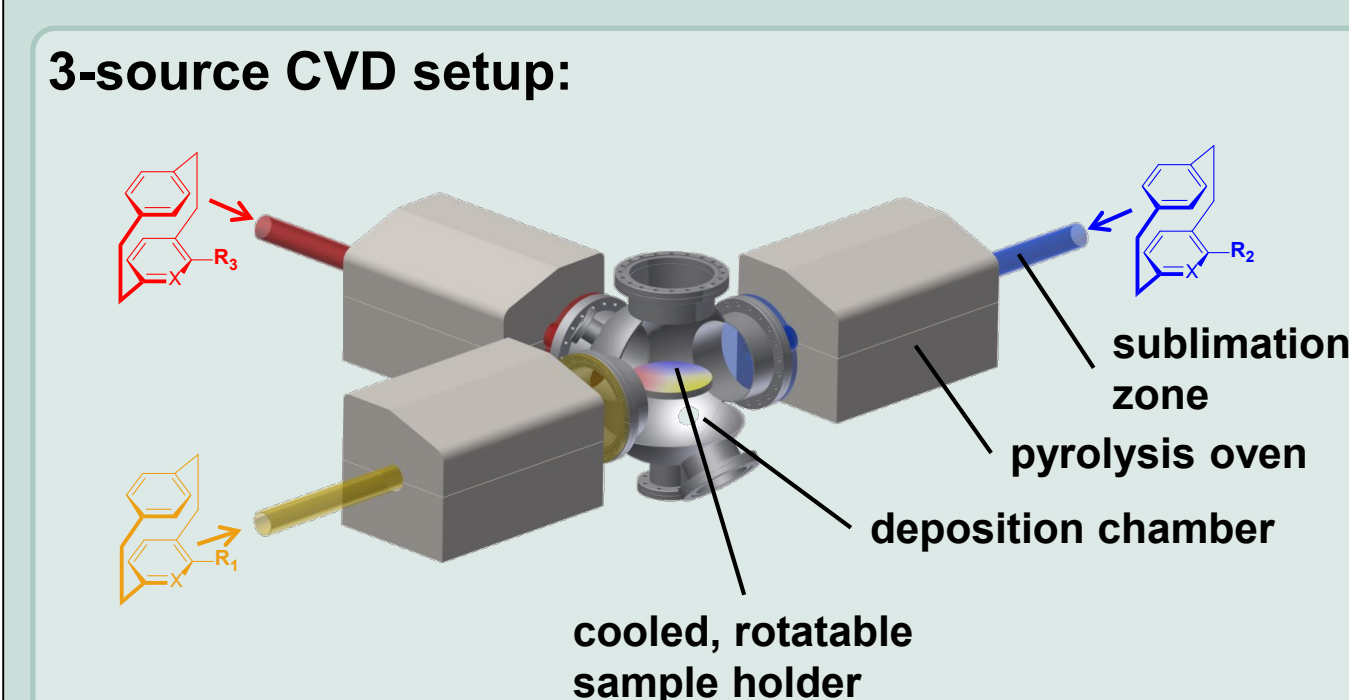
Electrohydrodynamic Co-Jetting: Multi-compartmental Particles, Fibers & Tissues



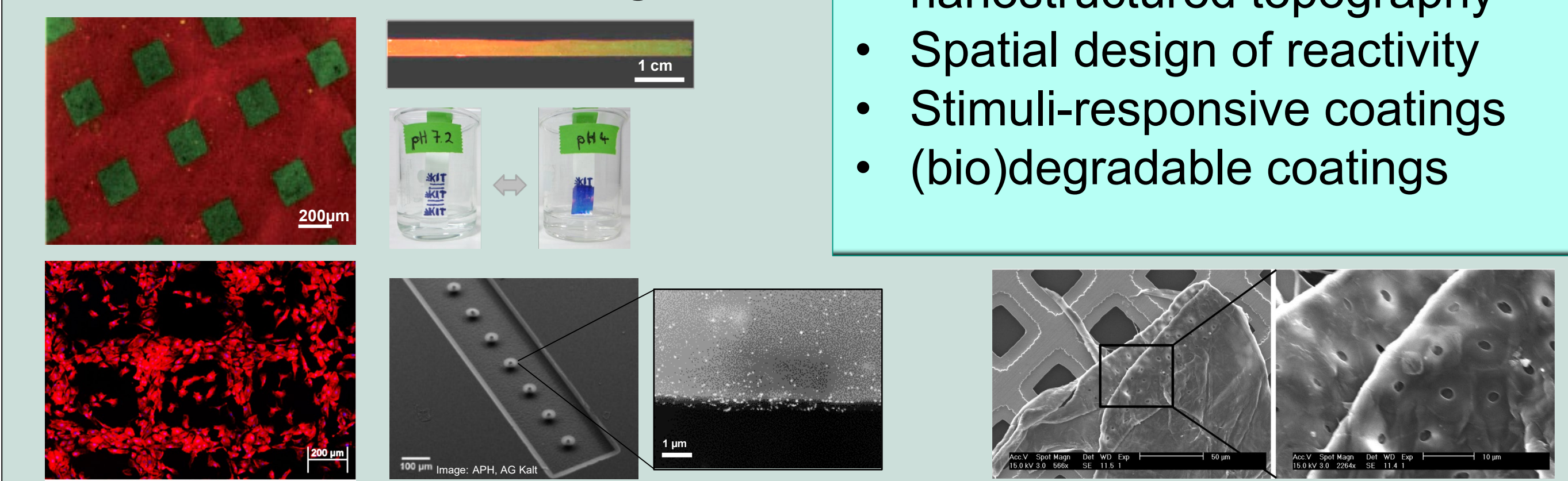
- Multi-compartmental structures for distinct drug delivery
- Selective surface modification
- Core-Shell/Hollow Geometry
- Modified electrospinning process for precision design of 3D/4D-scaffold structures for Tissue Engineering
- Customizable pore geometries
- Enzyme-loaded structures
- UV/vis sensitive hydrogels



Chemical Vapor Deposition: Multifunctional Polymer Coatings



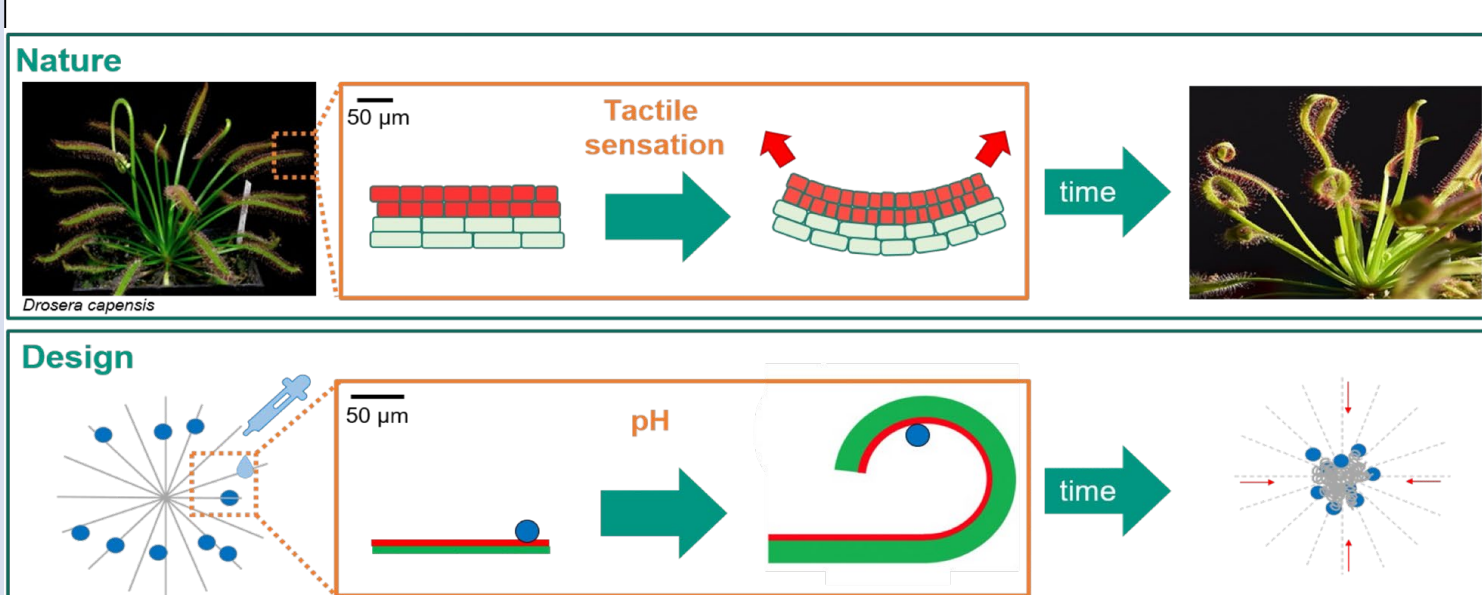
2D- and 3D-structured coatings



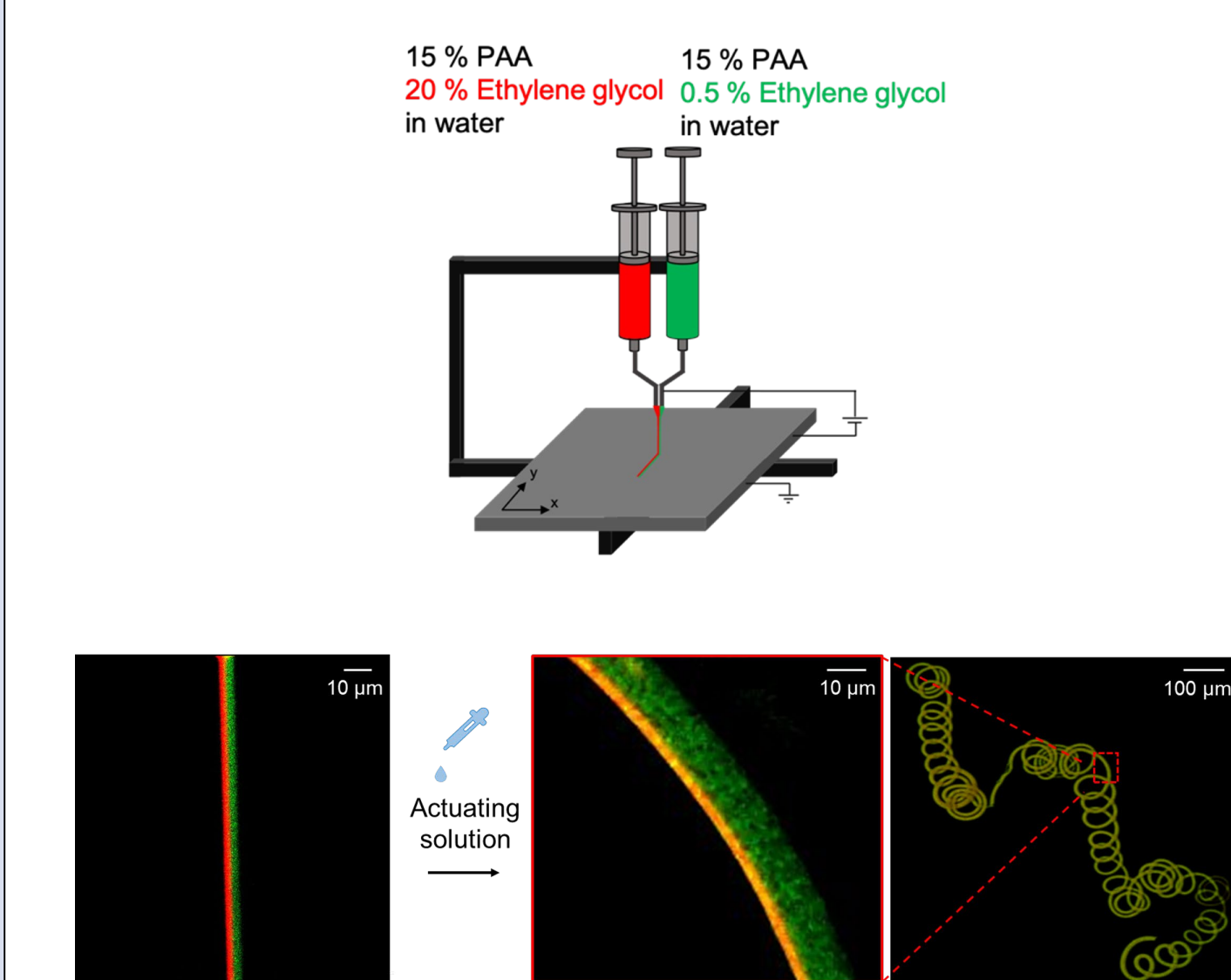
- Chemical Vapor Deposition Polymerisation (CVD) of functional [2.2]Paracyclophane derivatives
- Copolymer coatings with controlled (bio)orthogonal reactivity
- Coating of micro- and nanostructured topography
- Spatial design of reactivity
- Stimuli-responsive coatings
- (bio)degradable coatings

Directed Particle Transport via Reconfigurable Fiber Networks

K. Cu et al., *Advanced Functional Materials*, 2022, 32(35), 2204080.

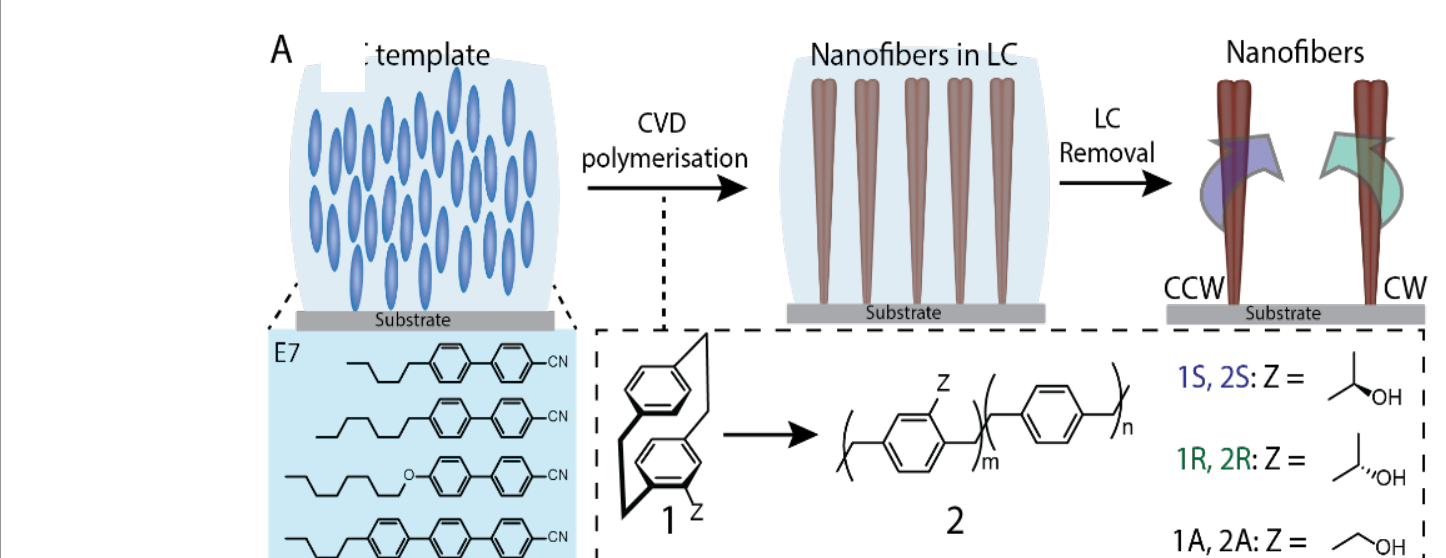


- differential swelling of fiber compartments upon neutral pH exposure → shape reconfiguration
- Opportunities for microanalytical systems by circumventing mass transport limitations

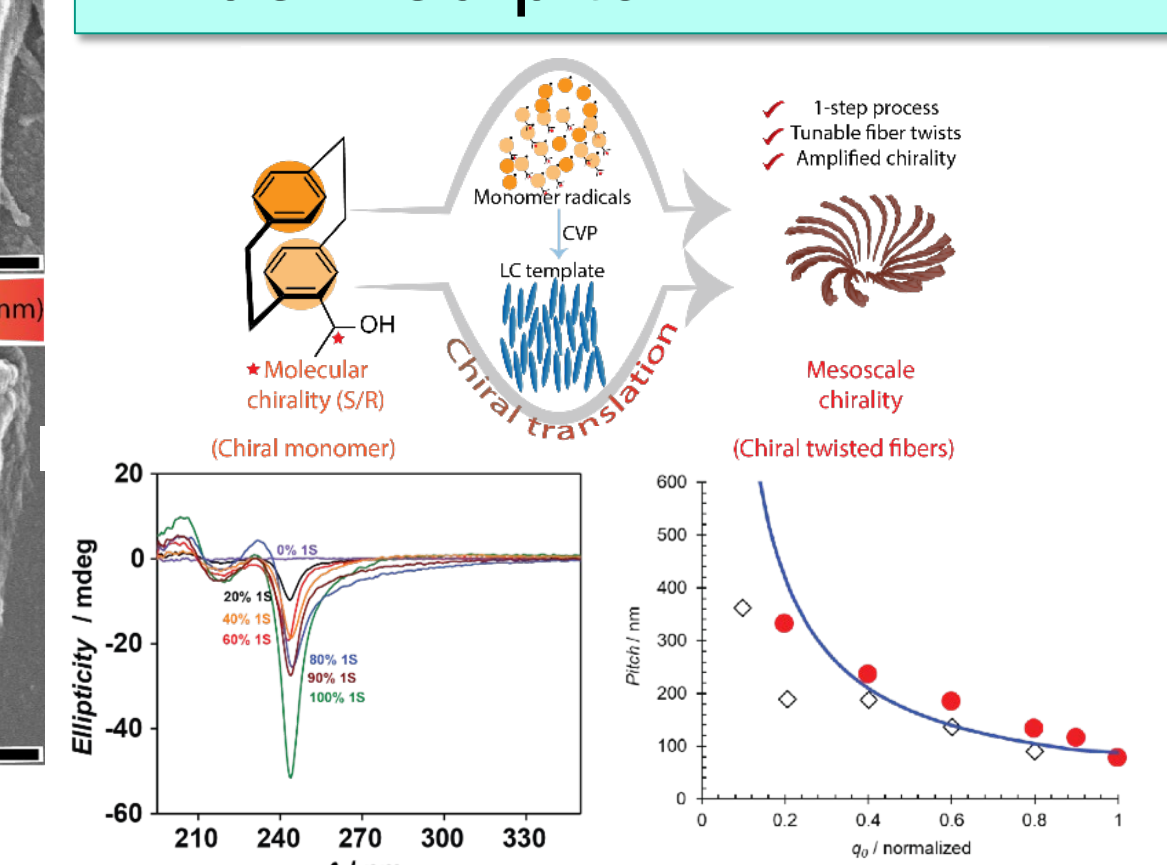
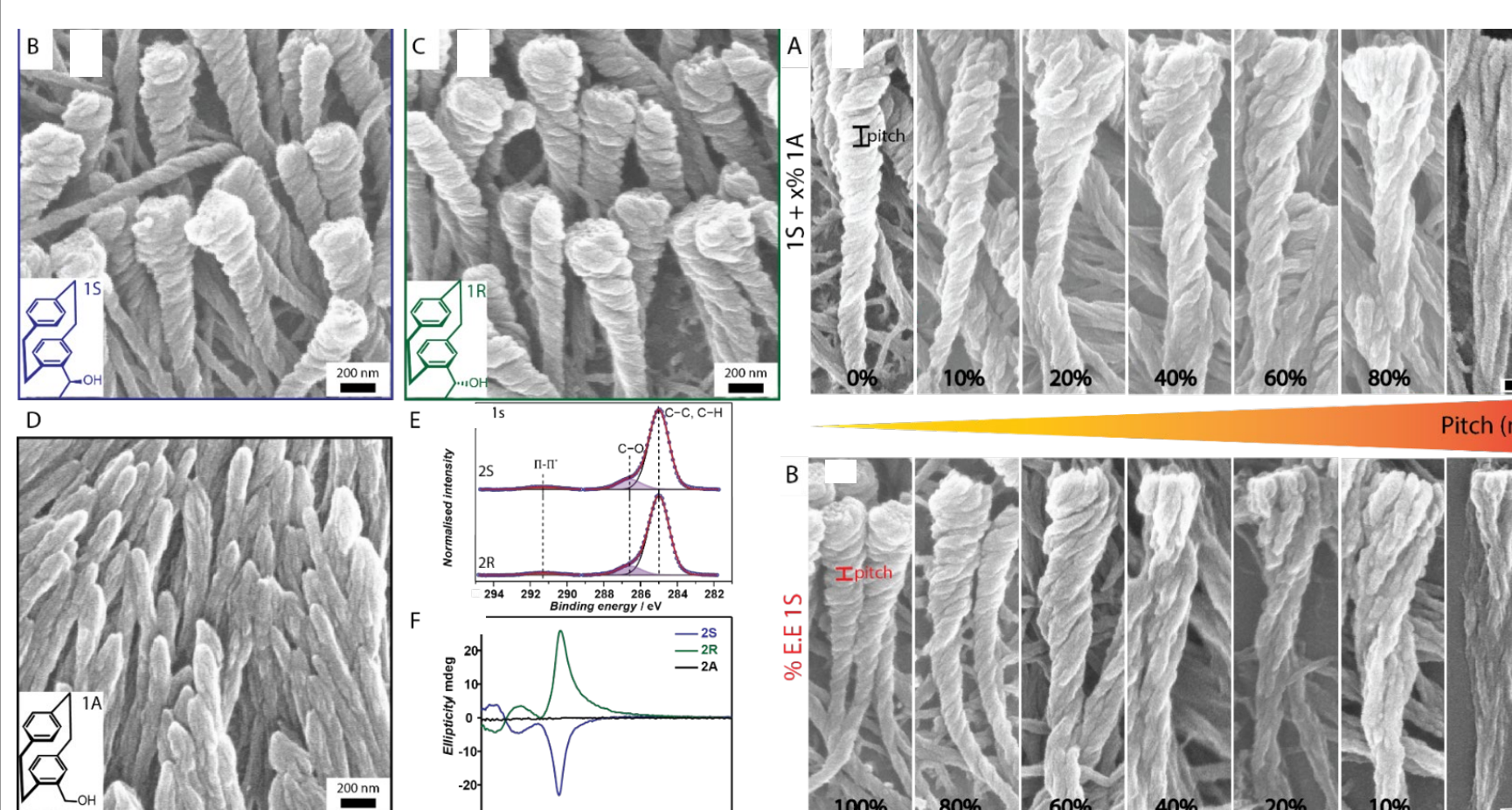


Surfaces Decorated with Enantiomorphically Pure Polymer Nanohelices via Hierarchical Chirality Transfer across Multiple Length Scales

D. Varadharajan et al., *Advanced Materials*, 2022, 34(9), 2108386.

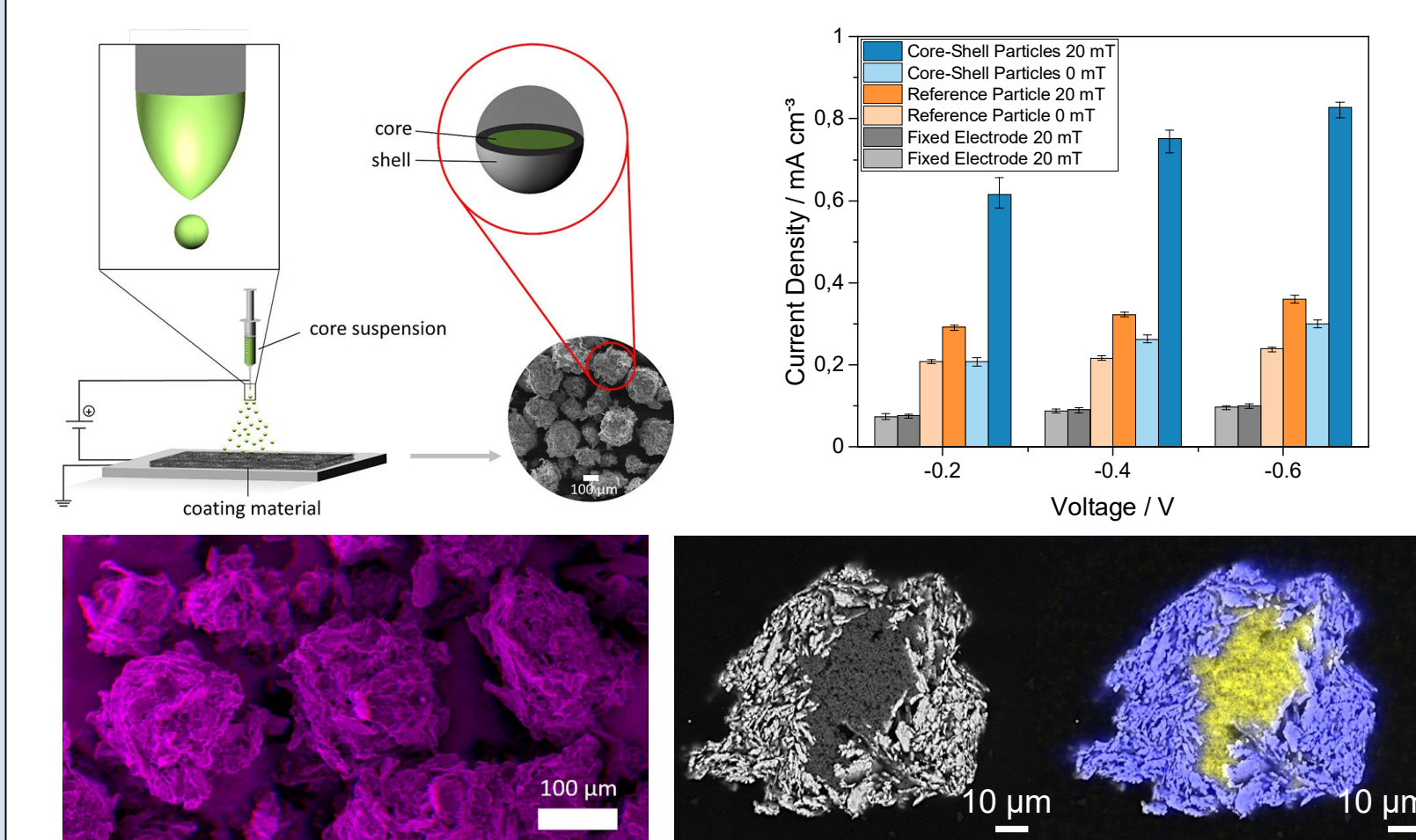


- 3D Nanofibers via deposition into liquid crystal templates
- Chirality and enantiomeric purity of precursor lead to nanohelical structure with defined pitch



Multifunctional Core-Shell Particle Electrodes for Application in Fluidized Bed Reactors

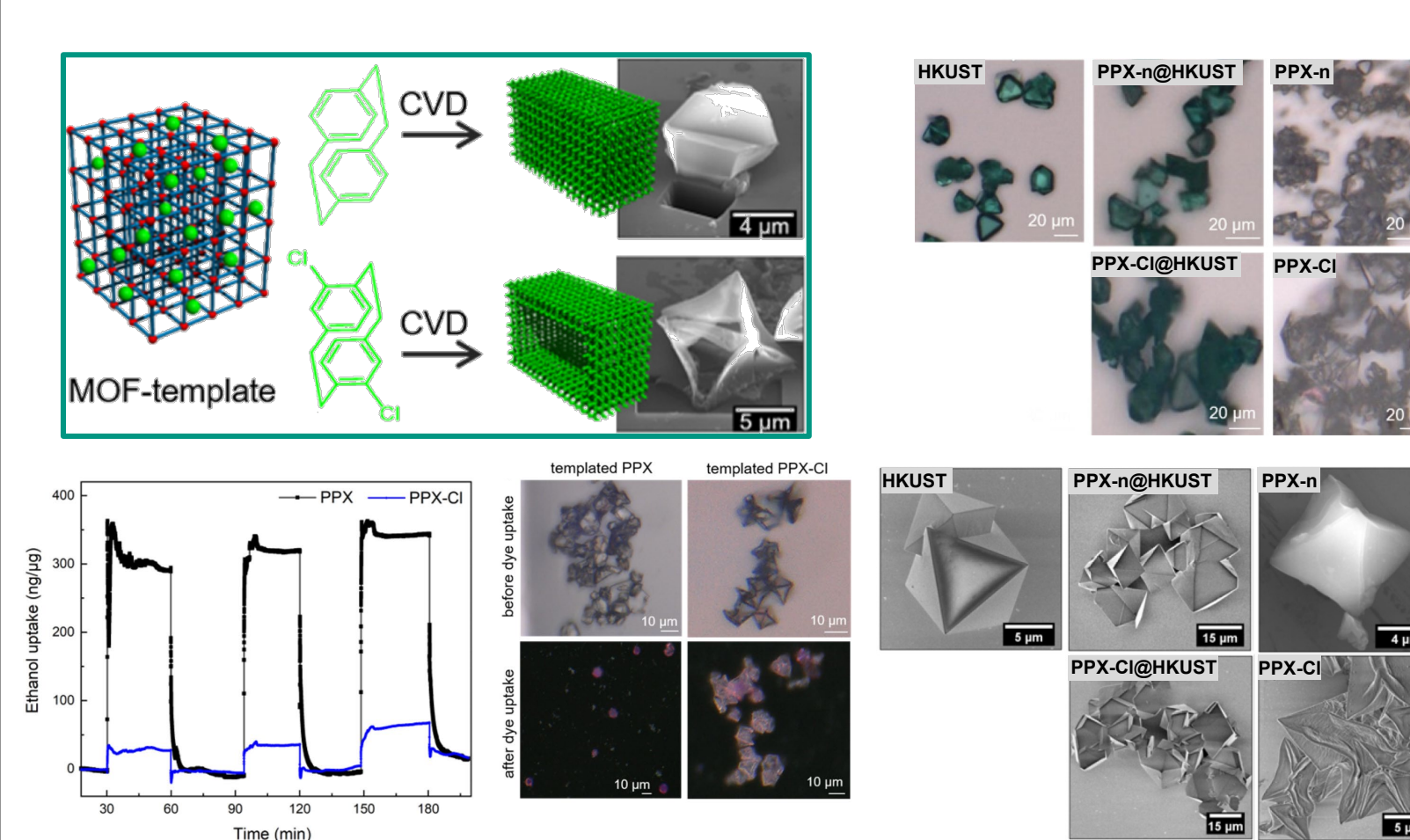
M. Klaiber et al., *ACS Applied Engineering Materials*, 2022, DOI: 10.1021/acsaem.2c00072.



- Two-step process for preparation of magnetizable fluidized bed electrodes based on electrospraying of magnetite/poly(methyl methacrylate) suspensions into a graphite powder bed
- 2-fold increase in current densities

Solid and Hollow Poly(p-xylylene) Particles Synthesis via Metal-Organic Framework-Templated Chemical Vapor Polymerization

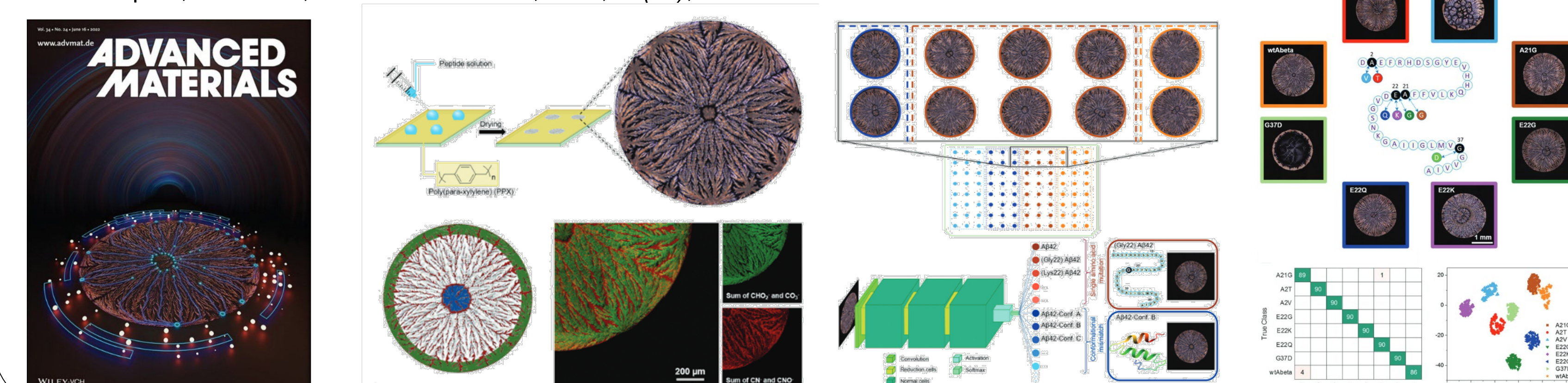
S. Begum et al., *Chemistry of Materials*, 2022, 34(14), 6268.



- Molecularly controlled deposition into metal-organic framework particles
- subtle changes in chemical composition of precursors determine templated morphologies

Neuron network assisted Protein/Peptide analytics Deep-Learning-Assisted Stratification of Amyloid Beta Mutants Using Droplet Patterns

A. Jehanipour, J. Lahann, *Advanced Materials*, 2022, 34(24), 2110404.



- Fingerprint-like pattern of drying droplets contain critical information on primary and secondary peptide structure
- Analysis of polarized light microscopy images using trained deep convolutional neuron network
- comprehensive stratification of eight amyloid beta (Aβ) variants and distinct Aβ42 peptide conformations with predictive accuracies above 99%