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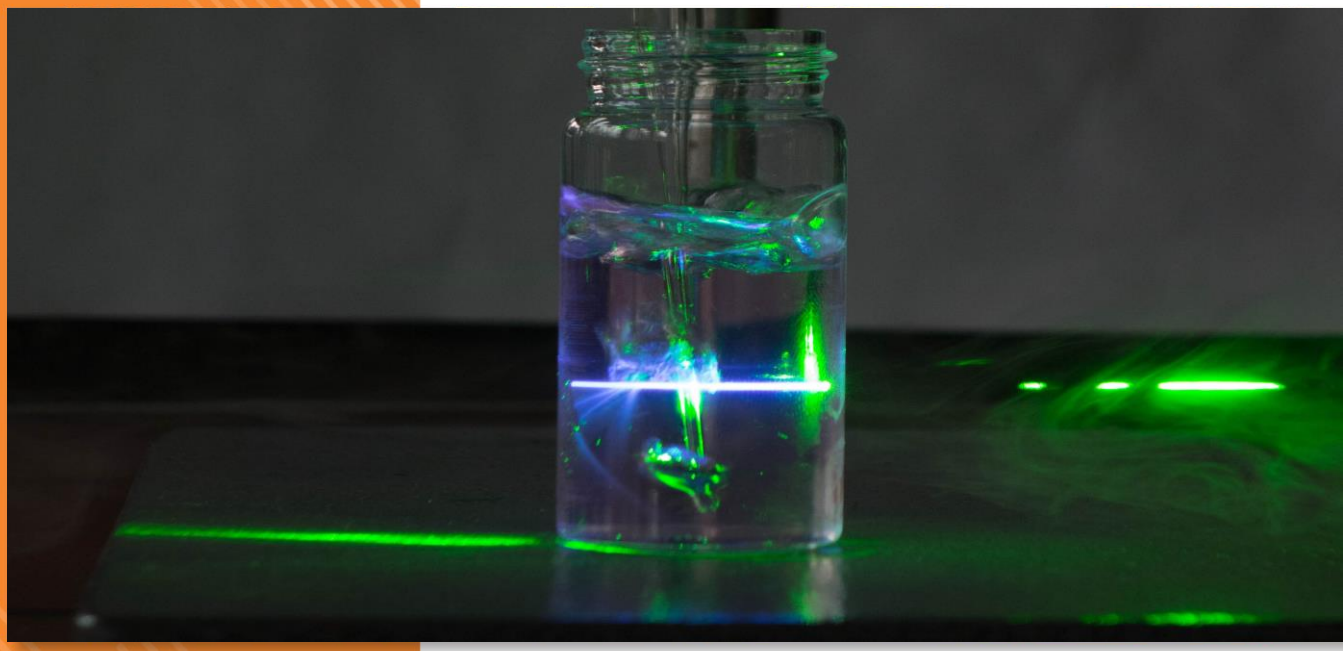

Organic Nanoporous Materials for Energy and Environmental Sustainability

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Interfacial polymerization developing processable nanoporous organic thin films of crystalline covalent organic frameworks (COFs) could be promising for applications from molecular separation to energy storage. In this context, we achieved a room-temperature transformation of an organic imine cage to a free-standing COF film at the aqueous-organic interface using an amine linker exchange strategy, producing highly porous and crystalline COF films in 24 h. The COF film showed high permeance and excellent molecular sieving performance. We have examined the early stage dynamics of the above interfacial post-synthetic linker exchange (PLE) process using pendant drop tensiometry elucidating the expedited COF growth. Additionally, a 2D electrochromic COF (EC-COF) film having tunable redox functionalities was developed at the solid-liquid interface with broad absorption across the UV-to-NIR range, showing three-state anodic electrochromism, high color contrast (~ 60 % in the NIR), and fast switching. A prototype device using the EC-COF film as a safety indicator for electronic circuits has been developed. We further expand the scope of redox-active amorphous porous organic polymers in sodium-ion battery electrodes. The key aspects of some of these findings will be presented.

28. Juli 2025
16:00 Uhr
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