



AVVISO DI SEMINARIO

“Revolutionizing materials engineering and processing with microfluidic tools”

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Abstract

Controlling and understanding the mechanisms that govern crystallization processes is crucial in contemporary materials science, particularly in the field of reticular solids, where significant challenges remain. In this seminar, I will demonstrate how microfluidic synthetic conditions can control the size and shape of various functional porous crystals, such as metal-organic frameworks (MOFs) and covalent-organic frameworks (COFs). Specifically, I will show that microfluidic synthesis can produce the largest MOF single crystals with controlled nonequilibrium shapes reported to date, in contrast to the typical polyhedral microcrystals formed under bulk crystallization conditions. Additionally, I will illustrate how microfluidic technologies can address several challenges in the COF research area. For instance, I will demonstrate that a microfluidic device can enhance the processability of COFs, enabling the creation of macroscopic architectures composed solely of COFs with arbitrary shapes. This is particularly significant given that COFs are typically obtained as powders with limited solubility and no melting point, making conventional processing techniques like solution processing or melt-extrusion inapplicable, which also hinders their use in many potential applications. Moreover, I will also present how our group utilizes microrobotic platforms to apply MOFs and COFs in biotechnology and other advanced fields. These microrobotic systems enable precise 3D manipulation of MOFs and COFs, facilitating innovative applications such as targeted drug delivery, biosensing, and tissue engineering. By integrating microrobotics with our advanced synthesis techniques, we can create highly specialized and functional materials tailored for specific biomedical applications. This approach not only enhances the versatility and functionality of MOFs and COFs but also opens new avenues for their use in cutting-edge biotechnological solutions.

La S.V. è invitata ad intervenire

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Il proponente

Prof.ssa Alessia Ciogli