

ICB PhD public presentations

MICROFLUIDIC ENVIRONMENTS: A USEFUL PLATFORM FOR SYNTHESIS, STUDY AND PROCESSING OF CRYSTALLINE MATERIALS

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Project Summary: The majority of the investigations on crystalline materials study their self-assembly process under equilibrium conditions, where only the thermodynamically stable species can be obtained. This limitation not only hampers the proper understanding of the self-assembly process, but it is a drawback for the effective formation of materials with desired properties. To tackle this challenge, we developed a microfluidic-based approach capable of pushing structures out-of-equilibrium and isolated the crystal structures that are not achievable through conventional approaches. Also, controlling the reaction-diffusion area and concentration gradient of the reagents, and hence, the kinetics of the reaction, we performed controlled synthesis of crystalline materials exhibiting metastability. On the other hand, we also demonstrated the ability of this method to produce processable fibers of crystalline materials. Surprisingly, this approach also enabled the controlled deposition and conformal printing of the produced fibers of crystalline materials on various surfaces. This development provides a promising platform for controlled synthesis, in-depth study and enhanced processing of crystalline materials.

CV. Afshin received his BSc in Chemical Eng. from Isfahan Uni. Tech., Iran (2011), during which he spent an exchange period at CEFET-MG, Brazil. He obtained his MSc, with distinction, in Chemical Eng. at Lappeenranta Uni. Tech., Finland (2014), after conducting his master's thesis in the laboratory of Prof. A. deMello at ETH Zurich. Since 2014, he is studying toward his PhD degree in the deMello group.