3D Printed Microfluidic Fabrication Methodology, Characterization, Mechanical Design, and Applications in Electrostatic Artificial Muscles and Benthic Microbial Fuel Cells

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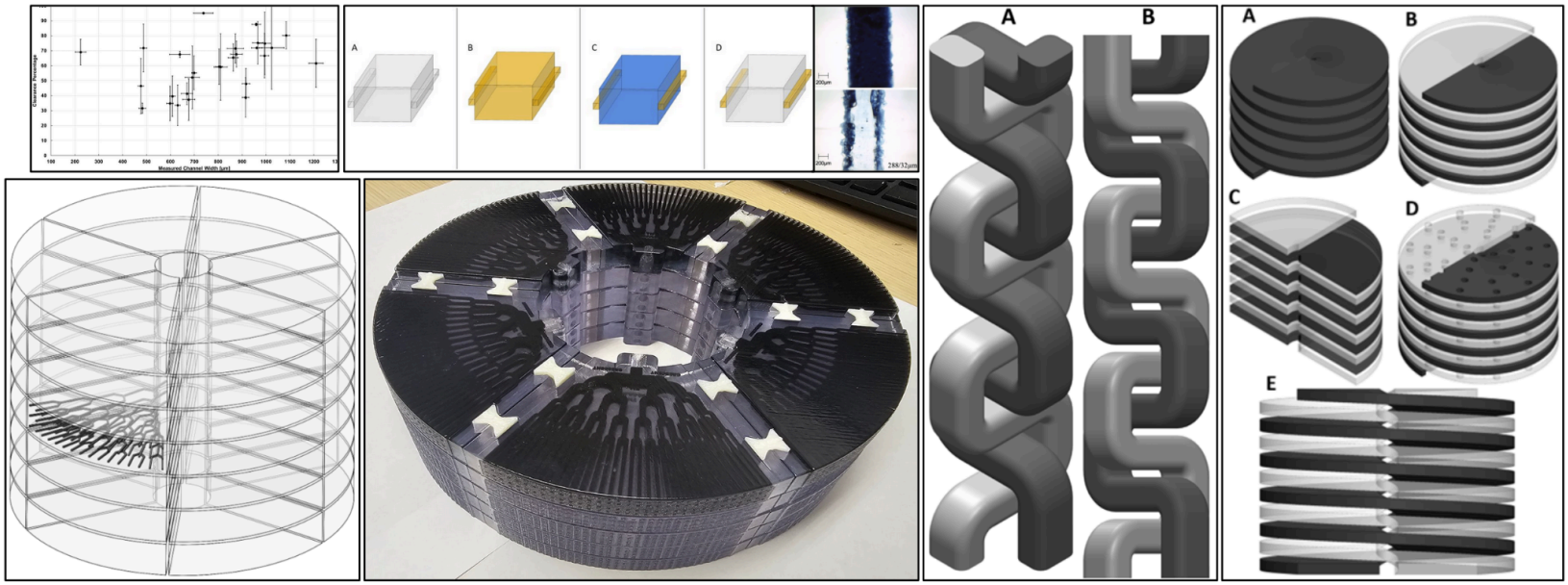

The fabrication of microfluidic devices often requires specialized methods. The development of these methods requires careful characterization and understanding of the processes involved. Using primarily polyjet 3D printing technology, microfluidics offer a wide scope of applications such as microfluidic benthic microbial fuel cells (MBMFCs) and electrostatic artificial muscles. MBMFCs benefit from the confinement of the microbes resulting in close proximity between the electrode and the organisms. Using a modular design called the Sponge, assembly and upscaling is possible. Electrostatic artificial muscles benefit from a microfluidic approach due to the non-linearity of electrostatic attraction creating disproportionate benefits when miniaturized. When designed with the proper architectures, these muscles offer great promise. 3D printing these MBMFCs and artificial muscles allows for mass producibility and scalability. An approach combining 3D printing and microfluidics facilitates the further development and implementation of these technologies.

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