Pushing the Limits of Active Microelectronics via Additive Manufacturing

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Abstract:

Traditional microelectronics rely on rigid silicon-based devices which are ideal for phones and computers but are ill-suited for wearable devices or microscopic robotics where there exists a need for flexible components that are resilient to potentially harsh environments. Additive manufacturing has been shown to produce flexible electronics using non-traditional materials such as electrolytes, but their applications are limited due to the resolution of the tools (~10 μm). Recent work broke through the as-printed submicron resolution limit by using a capillary flow printing technique, thus paving the way for us to explore unconventional materials for submicron transistors and memory devices with the ultimate goal of designing new architectures. We are also fabricating scaled printed devices for emerging fields such as micro-scale actuators for microscopic robotics that require patterned soft electrolytes for in-air operation. As a newly established lab, the Smith group is excited to push the limits of active microelectronics by leveraging cleanroom and printer-based fabrication techniques.