

Pushing the Limits of Active Microelectronics via Additive Manufacturing

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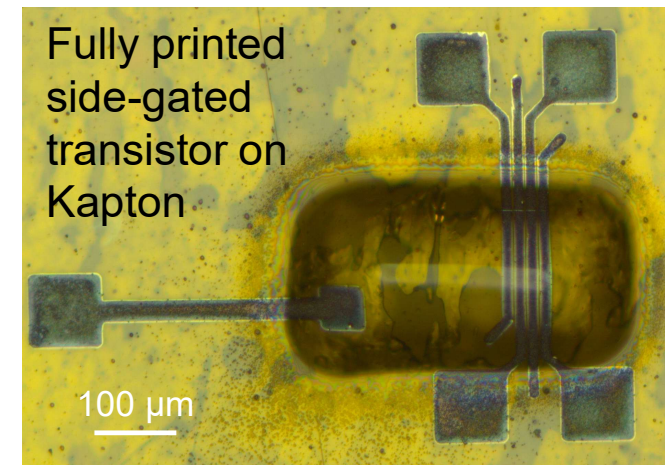
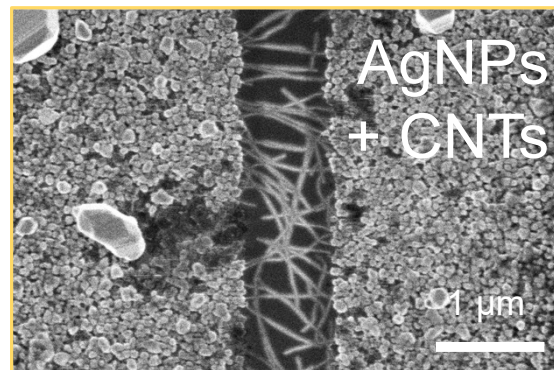
9/15/2026

Why additive manufacturing?

Only passive flexible components are commercially printed, reducing cost.



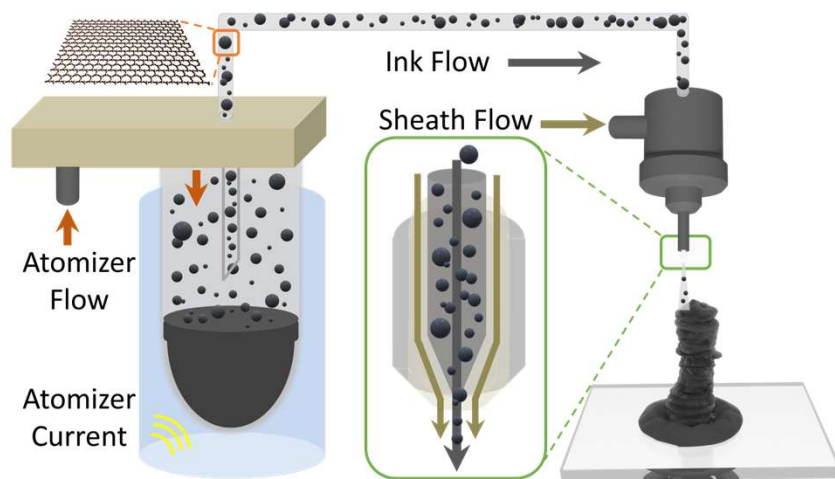
We have recently achieved submicron printed features, why can't we make low-cost printed active circuits?



B. N. Smith *et al.*, *Nature Electronics*, 8:1027-1037, 2025.

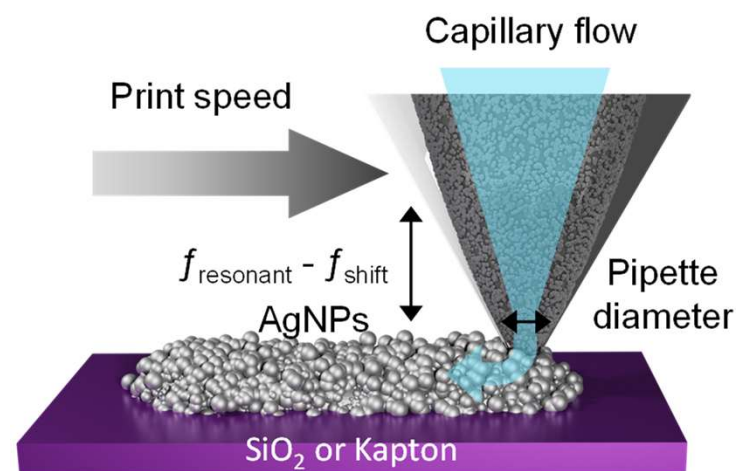
The additive manufacturing techniques in our lab

Aerosol jet printing



B. N. Smith *et al.*, *Small*, 20:2305170, 2024.

Capillary flow printing

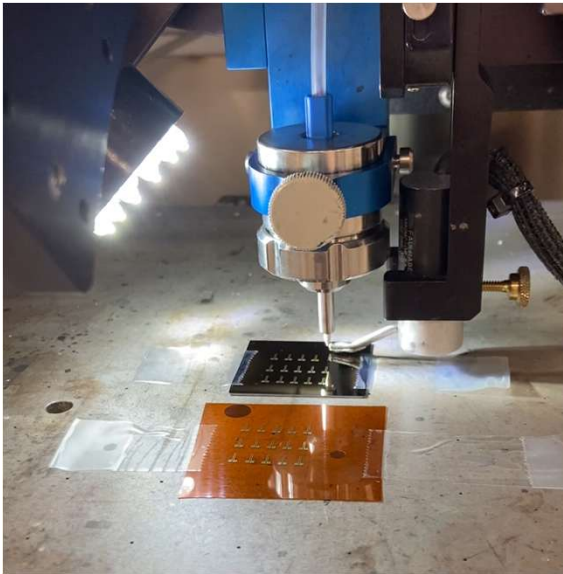


B. N. Smith *et al.*, *Nature Electronics*, 8:1027-1037, 2025.

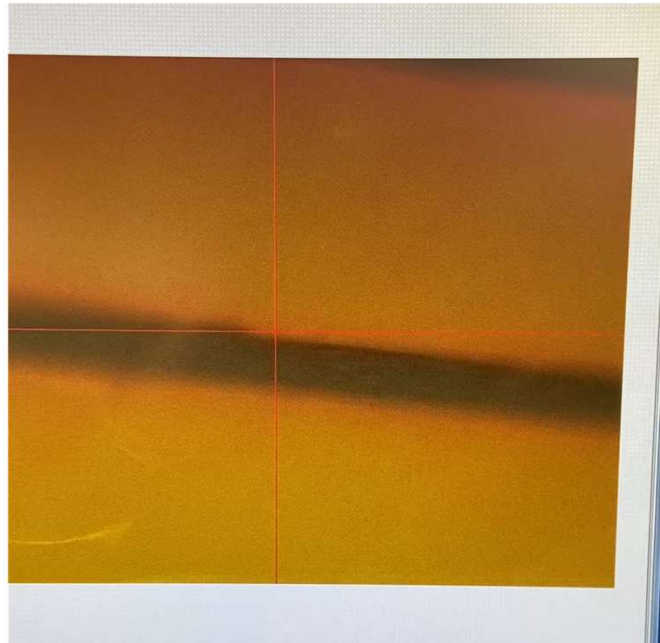
The additive manufacturing techniques in our lab

1) Aerosol jet printing: sensors, transistors, and memory devices

Printing on different substrates



Printing a thin film

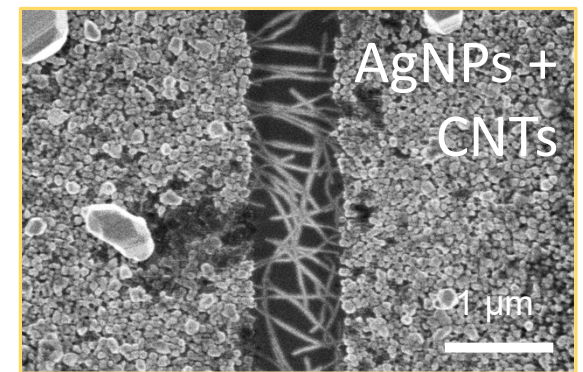
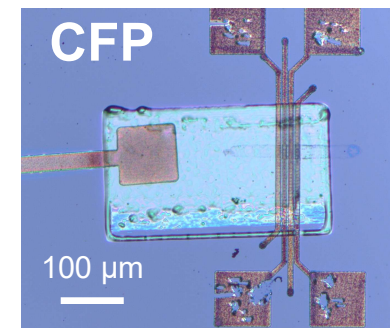
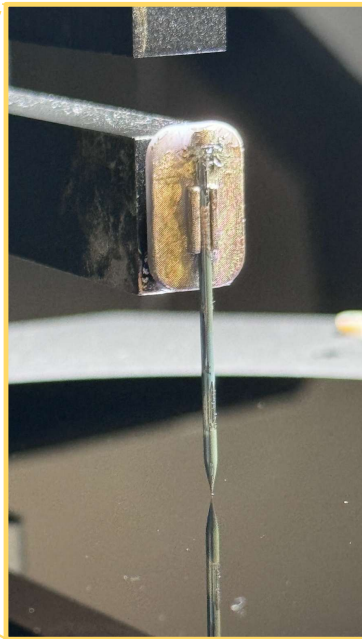
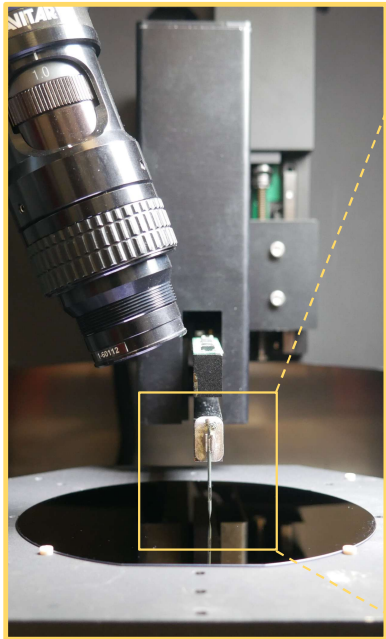


Printing 3D structures



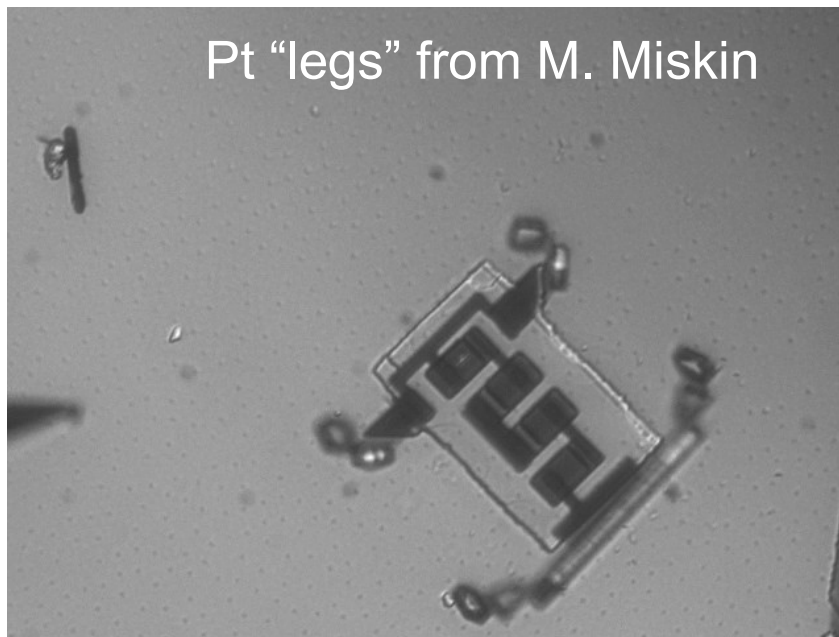
The additive manufacturing techniques in our lab

2) Capillary flow printing: submicron transistors



B. N. Smith *et al.*, *Nature Electronics*, 8:1027-1037, 2025.

Applications beyond circuits: microrobotics



Challenge with Pt: Limited cyclability

M. Z. Miskin *et al.*, *Nature*, 584:557-561, 2020.



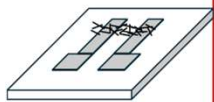
Still exploring Ni!

Come to my poster to learn more about my vision!

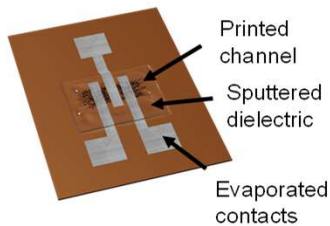
Traditional Cleanroom Techniques

Exploring cleanroom compatible techniques for patterning and etching soft- and nano-materials

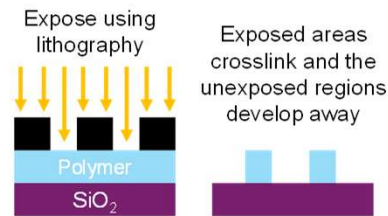
Circuits



Isolating printed material properties



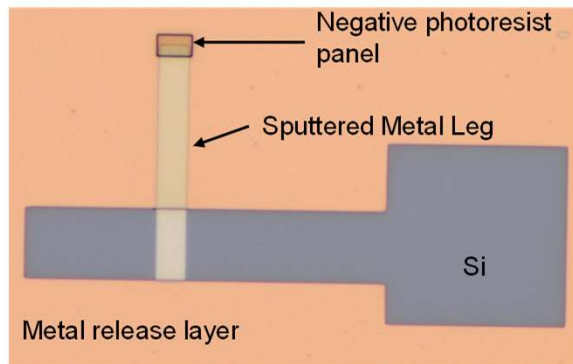
Crosslinking electrolytes for use as dielectrics



Micro-robotics



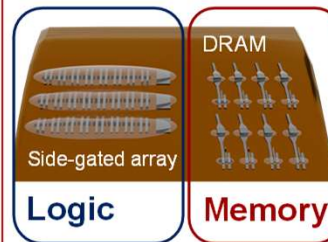
Fabricating microactuators as legs to microrobots



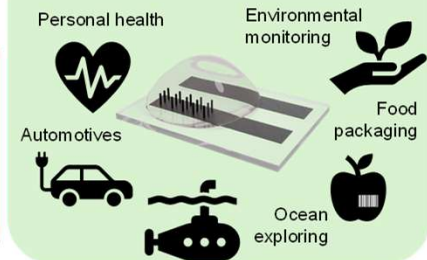
Additive Manufacturing

From printed devices to printed circuits: scaling printed microelectronics electronic systems

Novel circuit architectures



Solvent-resistant electronics



Printing soft materials for terrestrial microrobots

