

Executive Summary



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1. Title of the Project:

Prototype development + Incubation of a start-up company: Pattern creation at micro- and nano-scales using electric field-induced reaction and subsequent flow of liquefied reaction product.

2. Date of Start of the Project:

October 01, 2022

3. Aims and Objectives:

- Development of a prototype that utilizes the ability of the electric field to cause a chemical reaction (e.g., Cr and H₂O) to create patterns at micro-and nano-scales.
- Optimization of the prototype and related process parameters to create microelectronics grade patterns ranging from 100 nm to 1000 μm in width.
- Field trial and commercialization of the prototype (through a start-up to be incubated at IISc) that can produce moderately high-resolution patterns at moderately high-throughput: This fills a niche application space(s) on the “throughput-resolution” plot.

4. Significant achievements (not more than 500 words to include List of patents, publications, prototype, deployment etc.)

A prototype for the Water-Electro-Lithography (W-ELG) has been designed and fabricated (see the picture below).

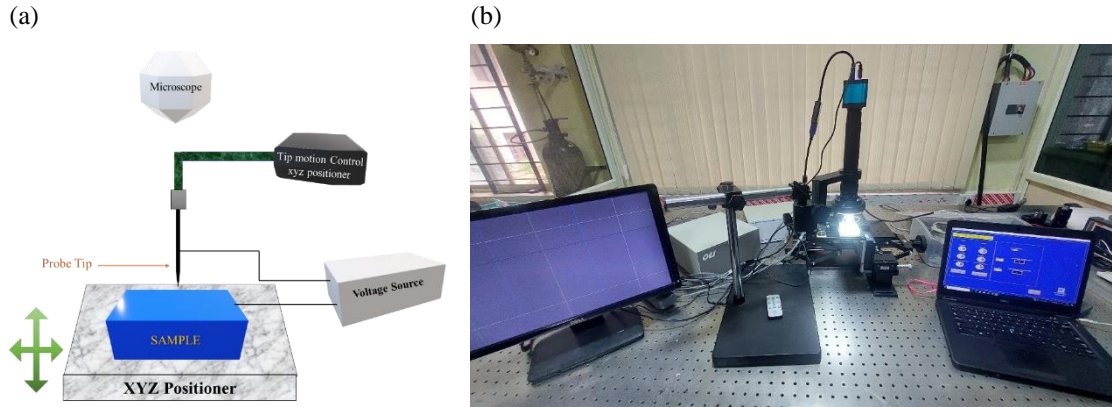
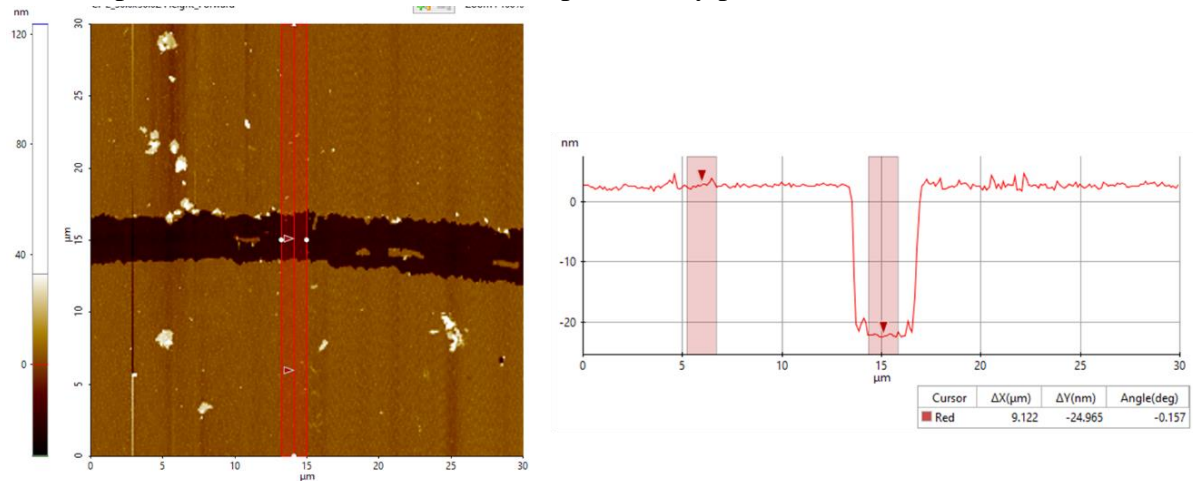


Fig. A: (a) Schematic illustration of the block diagram of the prototype of the W-ELG setup, and (b) a digital picture of the fabricated setup to perform W-ELG in the lab.

The setup above has been used to draw the preliminary patterns, as shown below:



5. Concluding remarks

A prototype of a W-ELG setup is successfully built and demonstrated to create a few patterns. Various parameters of the setup are currently being optimized. Work is currently being done to optimize the hardware as well as software of the prototype and increase the resolution of the patterns to fall within lower micrometers and upper hundreds of nanometers.