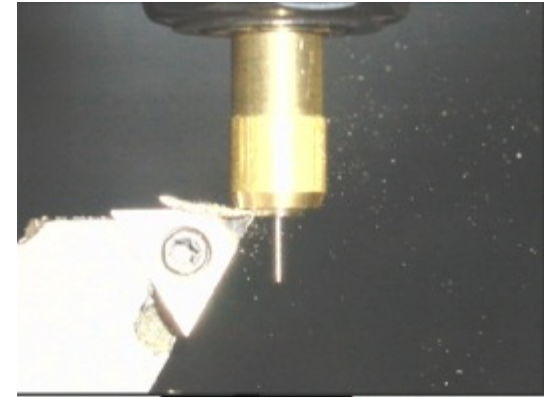


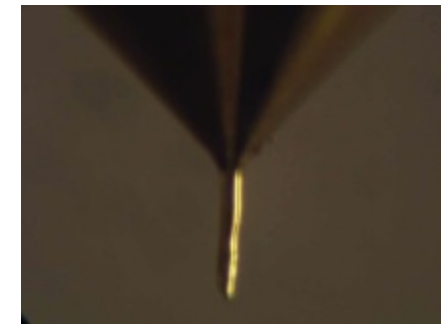
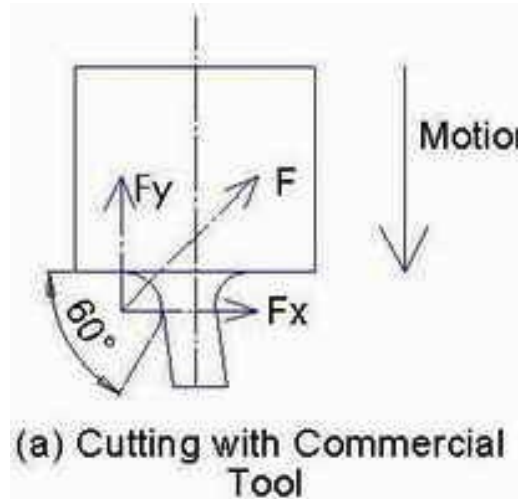
MICRO-TURNING AND MICRO-EDM

Micro Turning

- Turning of micro-shafts below $50\mu\text{m}$ is difficult due to radial direction of cutting force.
- Radial direction causes damage to the workpiece.
- Radial direction is brought about by larger tool nose radius.



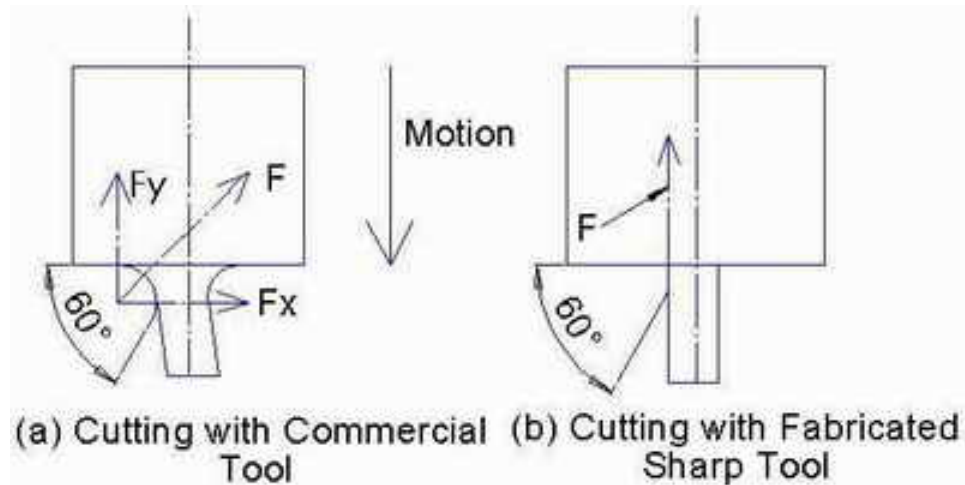
Commercial Cutting Tool



Shaft fabricated with commercial cutting tool

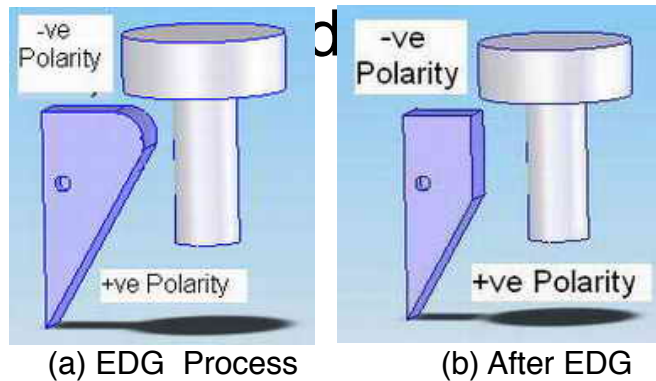
Micro Turning

- If the tool nose is replaced by a sharp tool tip, radial cutting force can be reduced and micro turning will allow for fabrication of smaller micro shafts.



Fabrication Sharp Tool Using Hybrid Processes

- PCD Tool can be modified in-situ using EDM/EDG process.
- Sharp tool tip with less than $5\mu\text{m}$ tool nose can be

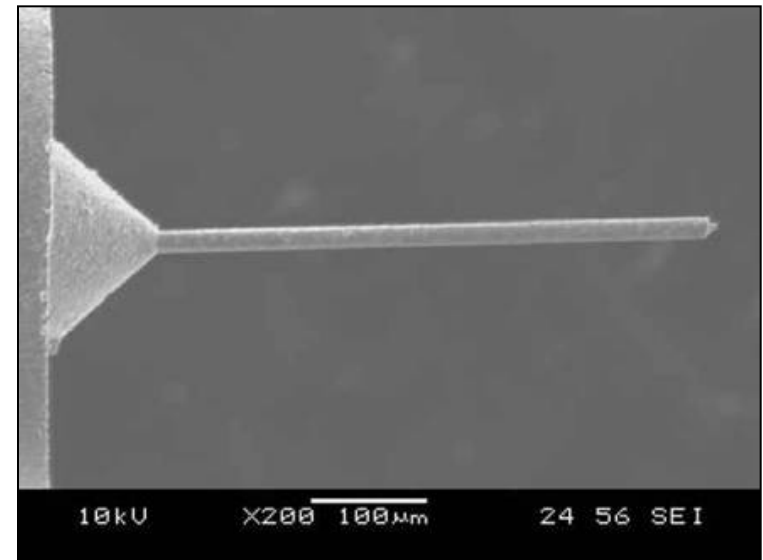
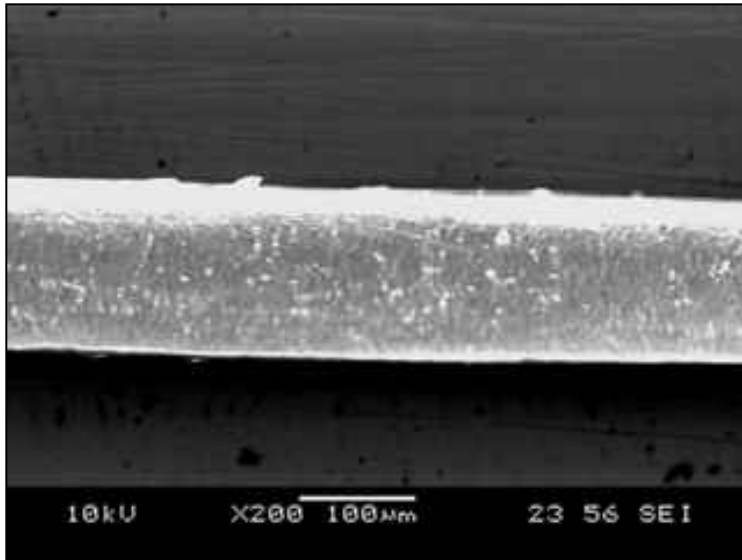


a) Commercial PCD Tool



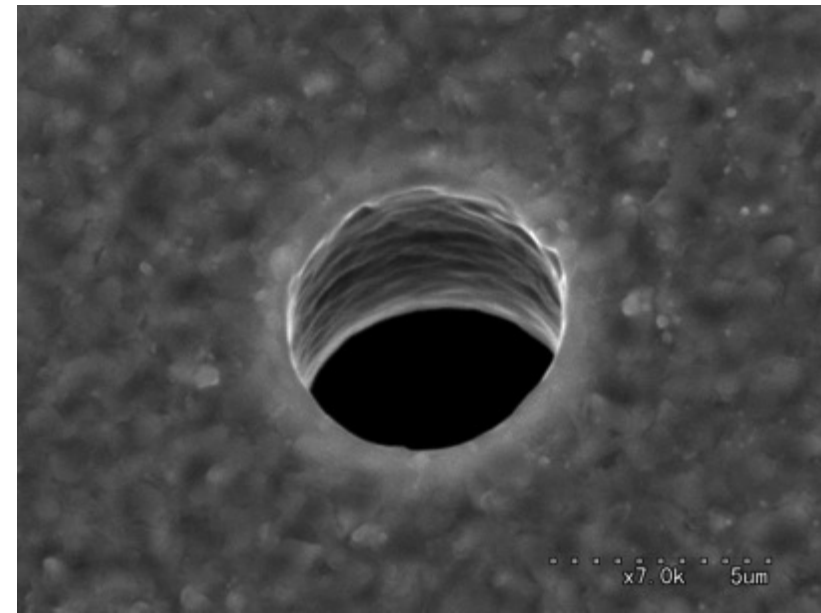
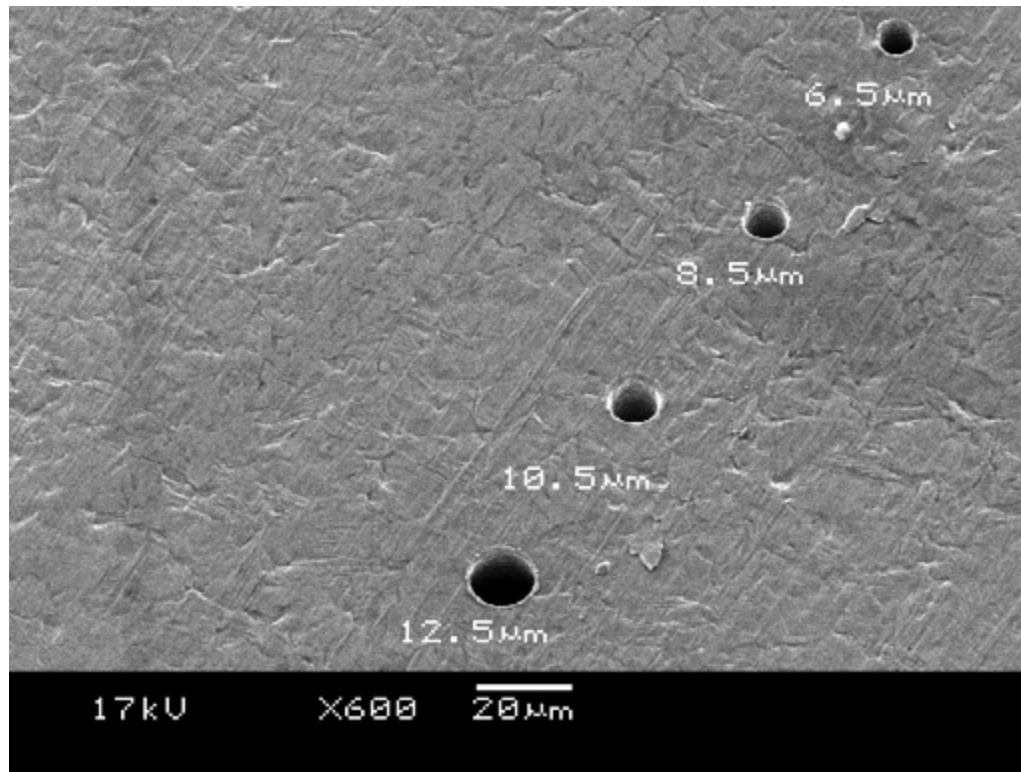
b) Modified PCD Tool

Use of Ultra Sharp Tool



A Hair on the Left and a 19µm Graphite Shaft on the Right (Same Magnification and Same Image Size for Comparison)

Fabricating Tiny Holes with Micro-turned Electrode



6.5 μm hole machined on 50 μm stainless steel plate, probably the world's smallest hole with highest aspect ratio