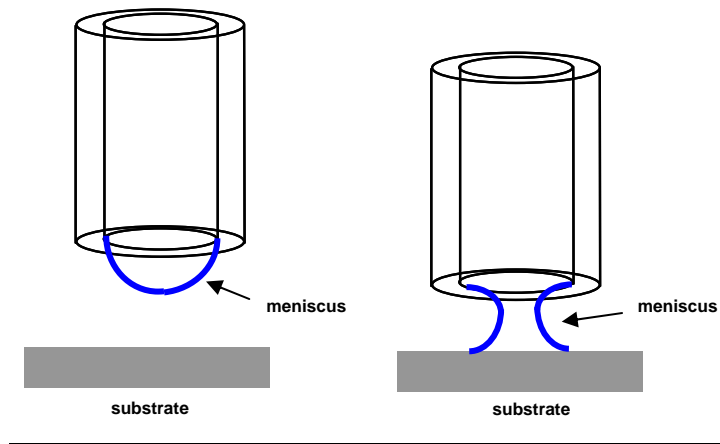


STM - based Liquid Nanodeposition

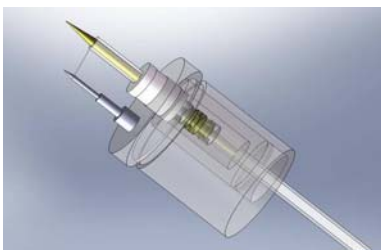
(in collaboration with Prof. Doug Schulz)

STM-Controlled Capillary Based Non-Contact Material Deposition Nanolithography consists of a Au-coated glass nanocapillary tip integrated into a commercial STM scanner platform where the tip serves the dual purpose of imaging and deposition. The small diameter hollow fiber (O.D. < 500 nm, I.D. < 100 nm) coupled with a conducting coating allows sub-angstrom-level z-resolution imaging using standard STM methodology. For fluid deposition, the tip is first located within 10 nm of the substrate before the nanocapillary is pressurized with a fluid ($P = 50\text{-}500\text{ KPa}$) leading to the formation of a small meniscus that then interacts with the underlying surface to give small spot of fluid deposition.

Liquid Deposition Concept



Modified STM Head



Initial results show the ability to form features less than 500 nm in diameter and 10 nm in thickness using α -terpineol as the model fluid and highly-oriented pyrolytic graphite as the substrate. In addition to non-contact deposition, this technology also allows non-contact imaging using the constant height STM mode thereby eliminating the difficulties associated with finding nanometer-sized features. Additional benefits of this new technology for nanoengineering and biomedical applications will be explored in future research.

- Sailer, R., Lutfurakhmanov, A., Akhatov, I., Schulz, D. Non-contact nanolithography. Proceedings of the 2007 NSTI Nanotechnology Conference and Trade Show, Santa Clara, CA, May 18-20, 2007.

Akhatov's research projects

- Lutfurakhmanov, A., Sailer, R., Akhatov, I., Schulz, D. Quick "easy?!" determination of the diameter of nanocapillaries. Proceedings of the 2007 NSTI Nanotechnology Conference and Trade Show, Santa Clara, CA, May 18-20, 2007.