



***Building an Implantable Artificial Kidney  
Part 2: Technology & Opportunities***

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Silicon microfabrication technology, which is fundamental to the production of semiconductor electronics and MEMS (microelectromechanical systems) devices, provides unprecedented control over feature size and geometry in a scalable manufacturing process. Advanced lithography, etching, and deposition techniques can be used to reliably construct components with critical dimensions as small as a few nanometers. High performance silicon membranes with biomimetic slit-shaped pores (silicon nanopore membranes) are utilized to build implantable medical devices for renal replacement therapy. The presentation will describe the fabrication of silicon nanopore membranes with a uniform distribution of sub-10 nm-wide pores, characterization of molecular selectivity, and surface modifications for enhanced biocompatibility. Performance evaluation of packaged membranes in preclinical settings will be discussed and potential benefits of the implantable bioartificial kidney in the clinical population will also be outlined.