



## ***Building an Implantable Artificial Kidney: Part 1: Landscape and Challenges***

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Kidneys are paired vital organs that remove wastes while regulating fluid, electrolyte, and acid-base balance. The physiology is fundamentally a membrane separation process followed by regulated reabsorption of essential water and salts. Permanent kidney failure is common (~100,000 new cases annually in the United States) and due to severe shortage of donor organs for transplant, most patients with kidney failure are treated with hemodialysis, a recurring membrane filtration process that partially replaces the failed kidney. We developed a novel membrane for blood separations that mimics the kidneys' own filters pore shape and size in order to develop an implantable artificial kidney.