

Abstract Submitted
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Ionic PN and PNP junctions – Diodes and Transistors ERIC KALMAN, UC Irvine, IVAN VLASSIOUK, PAVEL APEL, ZUZANNA SIWY — There are well-known devices for controlling the transport of electrons, but very few control ions in a solution. We have prepared ionic diodes and transistors that function in a similar manner to their semiconductor analogues. Ionic PN junctions were created by surface patterning single conical nanopores in polymer films, so that the pore walls are split into two sections: one with positive charge, and the other with negative. These diodes can achieve rectification degrees of several hundreds. Ionic PNP junctions were created by surface patterning single double-conical nanopores in polymer films with tip diameter between 2 and 6 nm, so that the pore walls are split into three sections: the two areas near the large pore openings which are positively charged, while the center of the pore, near the pore tip, is negatively charged. This device works in a similar fashion to a semiconducting BJT transistor, and we show that we can control the electric potential chemically in a manner sufficient to gate the ion current through the device.

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