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Schottky diode based on WS₂ crossed with PEDOT/PSSA¹

DELIRIS ORTIZ, NICHOLAS PINTO, University of Puerto Rico - Humacao, CARL NAYLOR, A.T. CHARLIE JOHNSON, University of Pennsylvania — An easy technique to fabricate a Schottky diode with WS₂ and PEDOT-PSSA under ambient conditions is presented. WS₂ is an air stable transition metal dichalcogenide semiconductor. When connected as a field effect transistor, WS₂ exhibited n-type behavior with a charge mobility of $\sim 7\text{cm}^2/\text{V}\cdot\text{s}$ on SiO₂. PEDOT/PSSA is a conducting polymer that can be electro-spun to form fibers with a conductivity of $\sim 1\text{ S/cm}$. In this work we fabricated a Schottky diode by crossing a CVD grown monolayer WS₂ crystal with a single electro-spun PEDOT/PSSA fiber. The resulting diode characteristics were analyzed assuming the standard thermionic emission model of a Schottky junction. Analysis of the results includes the ideality parameter of 4.75, diode rectification ratio ~ 10 , and a turn on voltage of 1.4V. Efforts to investigate if these parameters are tunable with a back gate will also be presented.

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