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Chemovoltaic Effect in H2 Oxidation on Catalytic Schottky Nanostructures[1] EDUARD KARPOV, SUHAS DASARI, University of Illinois at Chicago — Nonadiabatic energy dissipation by electron subsystem of nanostructured solids unveils interesting opportunities for solid-state energy conversion and sensor applications. We found that planar Pd/n-SiC, Pt/n-GaP and Pd/n-GaP Schottky structures with nanometer thickness metallization demonstrate generation of abovethermal reverse current (chemicurrent) during catalytic hydrogen-to-water oxidation process on the metal layer surface. The catalytic surface reaction leads to chemically induced excitation of hot electrons in the metallic cathode followed by the ballistic transport of these electrons across the metal nanolayer and over the Schottky barrier. The term chemovoltaic effect is proposed for the phenomenon by analogy with barrier layer photovoltaic effect. The observed chemicurrent greatly complements the usual thermionic emission current, and its magnitude is linearly proportional to the rate of formation and desorption of product water molecules from the nanostructure surface. The possibilities of utilizing the chemovoltaic effect in a novel class of chemical-to-electrical energy conversion devices are discussed.

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