

Description of Additional Supplementary Files

File Name: Supplementary Movie 1

Description: Experimental setup demonstrating the kinetic photovoltage along semiconductor-water interfaces. A rectangular light beam was formed by projecting a simulated solar source through two rectangular windows, whose scanning motion was driven by a programmed motor. Voltage signal across the silicon strip was recorded with a multimeter and displayed on the front panel.

File Name: Supplementary Software 1

Description: Numerical simulation of illumination-induced signal response along Si/water interface. The numerical simulation was implemented with Matlab and based on the finite difference method as described in Supplementary Note 3. The codes could generate the real-time distribution of potential and charge upon dynamic illumination, which has been used in Fig. 2b-d and Fig. 3a.