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Chemical Recognition Tunneling via Hydrogen Bond JIN HE, the Biodesign Insitute, Arizona State University, SHUAI CHANG, LISHA LIN, SHUO HUANG, ASHLEY KIBEL, MYEONG LEE, PEIMING ZHANG, OTTO SANKEY, STUART LINDSAY, Arizona State University — Hydrogen bonds enhance electron tunneling rates over vacuum tunneling as well as making chemically selective attachments to target molecules when patterns of donors and acceptors match. This raises the possibility of a completely new approach to transducing chemical information into electrical signals, based on forming an electrical circuit via a target molecule that bridges a gap between two electrodes by means of hydrogen bonding. Hydrogen-bond sensitive contrast has recently been demonstrated in scanning-tunneling microscope (STM) images of DNA bases. In this presentation, I will first show that the tunnel-current vs. distance decay curves acquired by STM change shape with the number of hydrogen bonds mediating an interaction. [1] Base composition of DNA oligomers can be resolved by this method. Further studies demonstrate that these tunnel-current decay signals can be used to count the number of hydrogen bonds in interactions between DNA bases and related compounds. The signals are partially mechanical in origin, reflecting the tensile strength of a tunnel junction held together with hydrogen bonds.

[1] He, J., Lin, L., Zhang, P. & Lindsay, S. M. *Nano Letters* **7**, 3854-3858 (2007).

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