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Charge sensing by altering the phase transition in VO2 SUHAS KUMAR, RAHIM ESFANDYARPOUR[1], RONALD DAVIS, YOSHIO NISHI, Stanford University — We use vanadium dioxide to sense changes in surface charge accumulation and explore possibilities of sensing presence of large polar molecules. It was shown last year [1] that surface charge accumulation can cause bulk delocalization. It was also shown that surface charge accumulation can cause a decrease in the insulator-metal transition temperature of vanadium dioxide. We use this concept and replace the surface charges with molecules that have a net polarization. We used biotinylated bovine serum albumin (BBSA) and streptavidin in our experiments. We observed a change in the potential and current at which the switching of resistance happened. This implied a change in the power and hence the temperature at which the Mott transition happened. When these molecules are held on the surface of VO2, we postulate that they transfer charges, which is what we are sensing as changes in the temperature at which a phase transition happens. We believe this shows the possibility of sensing a variety of molecules that are of interest to biologists, chemists and environmentalists. [1] Nakano et. al., Nature 487, 459 (2012)

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