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pH and Protein Sensing with Functionalized Semiconducting Oxide Nanobelt FETs YI CHENG, C.S. YUN, G.F. STROUSE, P. XIONG, Florida State University, R.S. YANG, Z.L. WANG, Georgia Institute of Technology — We report solution pH sensing and selective protein detection with high-performance channel-limited field-effect transistors (FETs) based on single semiconducting oxide (ZnO and SnO_2) nanobelts[1]. The devices were integrated with PDMS microfluidic channels for analyte delivery and the source/drain contacts were passivated for in-solution sensing. pH sensing experiments were performed on FETs with functionalized and unmodified nanobelts. Functionalization of the nanobelts by APTES was found to greatly improve the pH sensitivity. The change in nanobelt conductance as functions of pH values at different gate voltages and ionic strengths showed high sensitivity and consistency. For the protein detection, we achieved highly selective biotinylation of the nanobelt channel with through APTES linkage. The specific binding of fluorescently-tagged streptavidin to the biotinylated nanobelt was verified by fluorescence microscopy; non-specific binding to the substrate was largely eliminated using PEG-silane passivation. The electrical responses of the biotinylated FETs to the streptavidin binding in PBS buffers of different pH values were systematically measured. The results will be presented and discussed. [1]Y. Cheng et al., Appl. Phys. Lett. **89**, 093114 (2006). *Supported by NSF NIRT Grant ECS-0210332.

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