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Directed Growth of ZnO Nanobridge Sensors using Carbonized Photoresist ASHLEY MASON, CHIEN-CHIH HUANG, BRIAN PELATT, JOHN CONLEY JR., Oregon State University, NANOMATERIALS AND DEVICES TEAM — Metal oxide nanowires (NWs) are a natural candidate for high sensitivity sensor applications due to their inherently high surface-to-volume ratio. However, developmental challenges still remain for wafer-scale methods to align and integrate NWs to lithographically-defined contacts. Recently, selective growth of ZnO NWs was achieved without a metal catalyst using lithographically-patterned carbonized photoresist (C-PR), but electrical measurements were not reported. We have used C-PR to construct directly-integrated ZnO nanobridge devices. PR was spun onto SiO2 coated Si samples, then patterned and carbonized in a reducing atmosphere. Vapor-solid transport was used to grow nanowires between C-PR pads to form nanobridge devices. Current-voltage measurements revealed a Schottky contact between the C-PR and NWs. Operation of these nanobridge devices as bottom gate (Si substrate) modulated transistors, UV sensors (up to two orders of magnitude current increase), and gas / humidity sensors is demonstrated.

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