**Scientific Achievement**

Surface science techniques were used to elucidate adsorption configurations and stable intermediates in the reaction of glucose and related C2 and C3 oxygenates on Pt(111), Pd(111) and Ni/Pd(111) model catalysts.

**Significance and Impact**

A fundamental understanding of the reaction pathways, intermediates and energetics for the conversion of large derivatives, as a function of metal structure and composition, facilitates the design of more active and selective catalysts for the production of fuels and chemicals from cellulosic biomass.

**Research Details**

- Glycolaldehyde, glyceraldehyde and glucose were dosed on model surfaces and studied with TPD, HREELS.
- Demonstrated for the first time the chemistry: Glucose undergoes ring opening upon adsorption; Aldoses adsorb in an η1-aldehyde configuration with transition to an α-oxo-η2 specie prior to C-H bond cleavage.
- Exp. results consistent with predictions from DFT.