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NO_x Binding and Dissociation: Enhanced Ferroelectric Surface Chemistry by Catalytic Monolayers[1] ARVIN KAKEKHANI, SOHRAB ISMAIL-BEIGI, Yale University — NO_x molecules are regulated air pollutants produced during automotive combustion. As part of an effort to design viable catalysts for NO_x decomposition operating at higher temperatures that would allow for improved fuel efficiency, we examine NO_x chemistry on ferroelectric perovskite surfaces. Changing the direction of ferroelectric polarization can modify surface electronic properties and may lead to switchable surface chemistry. Here, we describe our recent work on potentially enhanced surface chemistry using catalytic RuO_2 monolayers on perovskite ferroelectric substrates. In addition to thermodynamic stabilization of the RuO_2 layer, we present results on the polarization-dependent binding of NO, O_2, N_2, and atomic O and N. We present results showing that one key problem with current catalysts, involving the difficulty of releasing dissociation products (especially oxygen), can be ameliorated by this method.

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