

Abstract Submitted
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Surface chemically-switchable ultraviolet luminescence from interfacial two-dimensional electron gas JONATHAN E SPANIER, MOHAMMAD I ISLAM, Drexel University, DIOMEDES SALDANA-GRECO, University of Pennsylvania, ZONGQUAN GU, Drexel University, FENGGONG WANG, University of Pennsylvania, ERIC BRECKENFELD, University of Illinois at Urbana-Champaign, QINGYU LEI, Temple University, RUIJUAN XU, University of California at Berkeley, CHRISTOPHER J HAWLEY, Drexel University, XIAOXING XI, Temple University, LANE W MARTIN, University of California at Berkeley, ANDREW M RAPPE, University of Pennsylvania — We report intense, narrowlinewidth, surface chemisorption-activated and reversible ultraviolet (UV) photoluminescence from radiative recombination of the two-dimensional electron liquid with photo-excited holes at the $\text{LaAlO}_3/\text{SrTiO}_3$ interface. The switchable luminescence arises from an electron transfer-driven modification of the electronic structure via H-chemisorption onto AlO_2 -terminated LaAlO_3 , at least 2 nm away from the interface. Control of the onset of emission and its intensity are functionalities that go beyond the luminescence of compound semiconductor quantum wells. Connections between reversible chemisorption, fast electron transfer, and quantum-well luminescence suggest a new model for surface chemically reconfigurable solid-state UV optoelectronics and molecular sensing.

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