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Topological-Metal to Band-Insulator Transition in $(Bi_{1-x}In_x)_2Se_3$ Thin Films MATTHEW BRAHLEK, NAMRATA BANSAL, NIKESH KOIRALA, Rutgers University Physics and Astronomy Department, SU-YANG XU, MADHAB NEUPANE, CHANG LIU, M. ZAHID HASAN, Princeton University Physics Department, SEONGSHIK OH, Rutgers University Physics and Astronomy Department — By combining transport and photoemission measurements on $(Bi_{1-x}In_x)_2Se_3$ thin films, we report that this system transforms from a topologically nontrivial metal into a topologically trivial band insulator through three quantum phase transitions. At $x \approx$3%–7%, there is a transition from a topologically nontrivial metal to a trivial metal. At $x \approx$15%, the metal becomes a variable-range-hopping insulator. Finally, above $x \approx$25%, the system becomes a true band insulator with its resistance immeasurably large even at room temperature. This material provides a new venue to investigate topologically tunable physics and devices with seamless gating or tunneling insulators.

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