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Topological Spin-Polarized Electron Layer above the Surface of Ca-Terminated Bi_2Se_3[1] XIAOXIONG WANG, College of Science, Nanjing University of Science and Technology, Nanjing 210094, China, GUANG BIAN, TOM MILLER, TAICHANG CHIANG, Department of Physics, University of Illinois at Urbana-Champaign, 1110 West Green Street, Urbana, Illinois 61801-3080, USA — Spin-polarized gapless surface states on the boundary of topological insulators are of interest for spintronic applications. First-principles calculations show that adsorption of a Ca monolayer on films of the prototypical topological insulator, Bi_2Se_3, yields a substantial enhancement of the surface-state spin polarization, despite the low atomic mass of Ca and its weak spin-orbit coupling. Much of the topological surface electron distribution is transferred outside the Ca to form a polarized electron layer out in vacuum; this spatial separation from the substrate minimizes scattering by defects in Bi_2Se_3 and is very desirable for spin transport.

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