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Self-assembly of Epitaxial Monolayers for Vacuum Wafer Bonding.[1] IGOR ALTFEDER, BIQIN HUANG, IAN APPELBAUM, BARRY WALKER, University of Delaware — Self-assembled epitaxial metal monolayers can be used for hetero-integration of mismatched semiconductors, leading to simultaneously low interfacial resistance and high optical transparency. Lattice-mismatched wafers of Si(100) and Si(111) were bonded at room temperature in situ after vacuum deposition of a single atomic layer of Ag on them. The interfacial resistance was measured to be 3.9×10^{-4} ohm$\cdot$ cm^2 and the optical transmission of the interface at 2500 nm is approximately 98%. We discuss the important role of electron confinement in ultrathin Ag layers as a possible contributor to the bonding energy.

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