“Magic sized Au islands on MoS2”

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Abstract:

Quantum well states were found to play a critical role in determining the geometric structure of Au(111) islands grown on the surface of MoS2. Island stability increases as quantum states shift farther from the Fermi level, lowering the energy of the island. The wave nature of electrons causes the total energy to oscillate with island dimensions resulting in preferred or “magic” sizes. The preferred dimensions have a relatively large periodicity of nearly 2 nm and persist to much higher temperatures than have been observed in other electronic growth mode systems. These observations are likely due to the weak bonding at the Au/MoS2 van der Waals interface, which minimizes strain but can still induce epitaxial growth without a wetting layer or significant lattice matching. The abrupt van der Waals gap at the interface also gives rise to strong electronic confinement, ideal for the formation of quantum well states. These findings indicate the potential to explore electronic growth modes in a new class of systems based on metal - layered semiconductor interfaces.

Bio:

Dr. Andrew Stollenwerk is currently an associate professor of physics at the University of Northern Iowa with an experimental background in the growth and characterization of low dimensional materials. He received a B.S. in physics and a B.A. in mathematics at Miami University in 2002. His did his graduate work at the University at Albany SUNY, where he received his M.S. in physics in 2004 and his Ph.D. in Nanoscience in 2007. Before joining the University of Northern Iowa in 2009 he completed a two-year postdoctoral fellowship at Harvard University in the school of engineering and applied physics.