

Nanophysics: Bridging Quantum Mechanics and Material Science

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Abstract: *Nanophysics represents an interdisciplinary frontier where the principles of quantum mechanics intersect with the study of material science to explain and manipulate phenomena occurring at the nanometer scale. This research explores how quantum effects—such as confinement, tunneling, and quantized energy states—govern the physical and chemical behavior of nanomaterials. By analyzing the transition from bulk to nanoscale structures, the study highlights how fundamental physics underpins the development of novel materials with enhanced optical, electronic, and mechanical properties. The integration of theoretical modeling with experimental analysis demonstrates that understanding quantum behavior at the nanoscale is essential for advancing technologies in electronics, photonics, and energy systems. The paper concludes that nanophysics not only deepens our comprehension of matter but also provides a foundation for next-generation innovations in material design and applied nanotechnology.*

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