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Materials for Integrated Quantum Technology

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This paper reviews the latest materials for integrated quantum technology, focusing on silicon-based platforms. Silicon is a valuable material for quantum tech due to its well-understood electronic properties and mature fabrication technology. It is used to fine-tune qubit operations in quantum computers, making it a key platform for quantum bits. Other materials like superconductors and topological insulators also contribute to the field. Superconductors have minimal energy loss at low temperatures, ensuring quantum coherence. Topological insulators have robust properties against environmental disturbances due to their topological surface conductivity. Integration with other leading technology silicon and photonic materials is critical for quantum communication. Material compatibility is essential for maintaining quantum state coherence. The material scalability challenge is also considered, as assessing current fabrication techniques for large-scale manufacturing is crucial. The field of integrated quantum technology is exciting, but it is essential to consider interfaces with other quantum materials to overcome current limitations and build devices that can push the boundaries of quantum technology. This discussion could catalyze the deployment of quantum technology and open a new era of practical quantum applications.

Biography:

Dr Rohit Ramakrishnan is a Postdoctoral Researcher at the Indian Institute of Science, Bangalore, specializing in Quantum Technology and artificial intelligence. He holds a PhD in Photonic Quantum Technology from the same institution, with a broad expertise that spans theory, experiment, and design. Dr Ramakrishnan previously contributed to the Quantum Satellite project at the National University of Singapore and engaged in research on Quantum Optics at the Australian Defence Force Academy. He co-authored "The Quantum Internet – The Second Quantum Revolution" and actively advances Quantum Machine Learning, combining quantum technology with interdisciplinary research to push new frontiers.