

Record Performance in GeSn Quantum Wells with SiGeSn Barriers

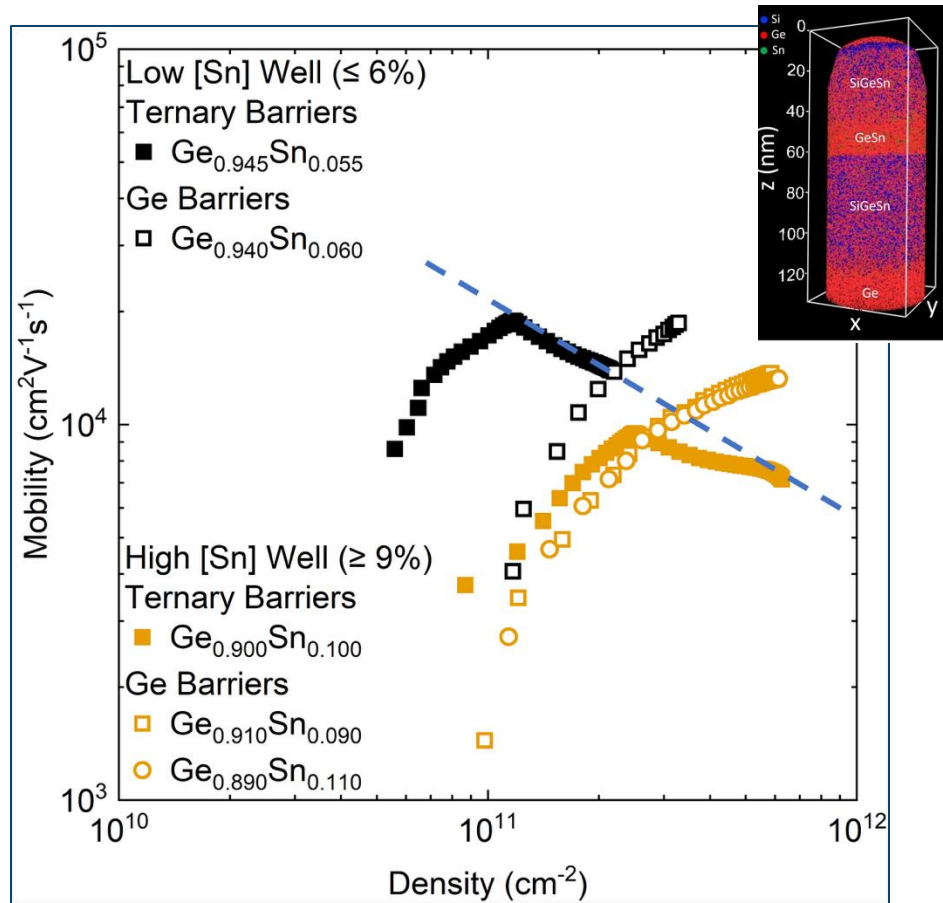


Figure: Mobility comparison showing significantly higher performance with SiGeSn barriers (filled) versus Ge barriers (open) at low carrier densities. Inset: APT data showing short range order.

Scientific Achievement

Record mobility of $19,000 \text{ cm}^2/\text{Vs}$ in GeSn quantum wells. Devices with SiGeSn barriers showed several times higher mobility at low carrier densities compared to conventional Ge barriers.

Significance and Impact

Suggests short range order in barrier layers may enhance carrier mobility beyond expectations. The high-quality quantum wells are impactful for quantum information science because of their silicon-compatibility and optoelectronics potential.

Research Details

- Fabricated heterostructure field-effect transistors
- Characterized electronic transport properties
- Used atom probe tomography to reveal short-range

Allemang, C. R.; Lidsky, D.; Sharma, P.; Liu, S.; Liu, J.; Qiu, Y.; Yu, S.; Lu, T.-M. High Mobility and Electrostatics in GeSn Quantum Wells With SiGeSn Barriers. *Advanced Electronic Materials*. 2025.

Work was performed, in part, at the Center for Integrated Nanotechnologies.



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