

Electronic Properties of Mixed Phase a/nc-Si:H

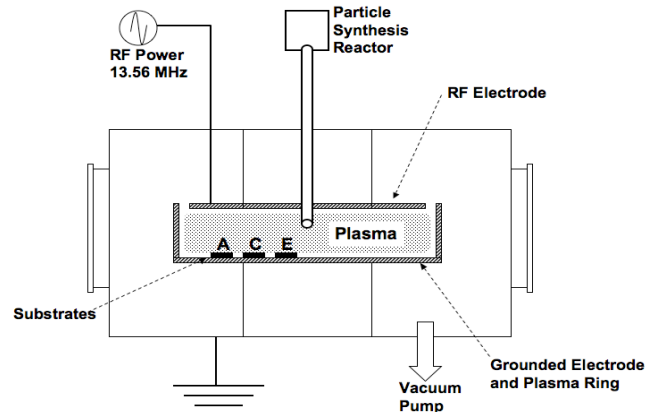
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NNIN Facilities utilized: Characterization Facility & Nanofabrication Facility

- Synthesis and characterization of mixed phase a-Si:H films containing Nanocrystalline Silicon inclusions (a/nc-Si:H)

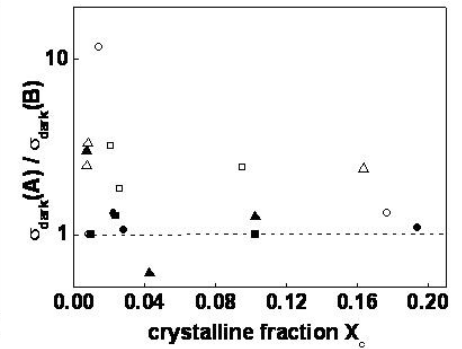
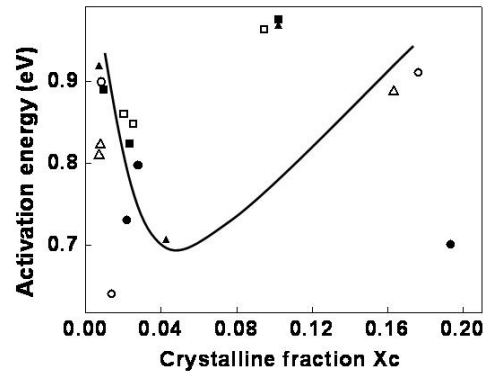
- ◆ Dual Chamber Co-Deposition system constructed to grow either undoped or doped a/nc-Si:H films
- ◆ Structural properties characterized via TEM, SEM, FTIR, Raman



Silicon nanocrystals are grown in Particle Synthesis Reactor and then injected into second capacitively-coupled PECVD system, in which hydrogenated amorphous silicon is deposited.

- Electronic Transport Sensitive to Nanocrystalline Inclusions

- ◆ Conductance is highest in undoped a/nc-Si:H films containing $X_c = 2 - 4\%$ nanocrystalline fraction
- ◆ Observed shift in Activation Energy accounted for quantitatively by electronic doping of a-Si:H by electron transfer by nanocrystals without compensating defect incorporation
- ◆ Reduction of light induced degradation σ_A/σ_B with nc inclusion



- Publications

- C. Anderson, C. Blackwell, J. Deneen, C. B. Carter, J. Kakalios and U. Kortshagen, Mat. Res. Soc. Symp. Proc. **910**, 79 (2006).
- Y. Adjallah, C. Blackwell, C. Anderson, U. Kortshagen and J. Kakalios, Mat. Res. Soc. Symp. Proc. **in press** (2008).
- C. Blackwell, X. Pi, U. Kortshagen, and J. Kakalios, Mat. Res. Soc. Symp. Proc. **in press** (2008).
- Y. Adjallah, C. Anderson, L. Wienkes, U. Kortshagen, and J. Kakalios, Phys. Rev. B **in press** (2009).