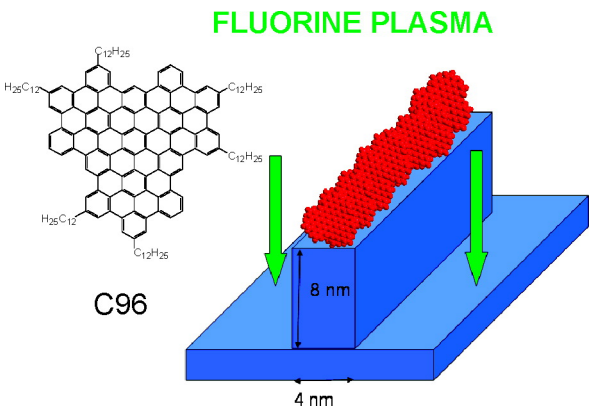
Nanostructuring of Silicon Surfaces for Phovoltaic Devices

The major impediment in the direct conversion of sunlight into electricity through photovoltaic devices has been the conflict between low cost (amorphous silicon or hybrid devices) and efficiency (single crystal silicon cells). A team led by Mohan Srinivasarao at the Georgia Institute of Technology has been investigating the use of molecular self assembly to increase the efficiency of silicon solar cells while making them cost effective. The team has demonstrated the use of large poly-aromatic molecules (C96) as passive masks to plasma etch fine structures onto silicon surfaces without the use of expensive lithographic tools. This method promises to increase the efficiency of solar cells, thus enabling a low cost route to texturing silicon solar cells.



Use of graphitic (hexabenzocoronene-derived) molecules (C96) produces cholesteric ribbons which serve as molecular resists in a fluorine plasma. This procedure allows the shape of the molecular assemblies to be etched into the underlying silicon, validating the concept of "molecular resists." Credit: Georgia Tech.

Jarvholm, J., M. Srinivasarao, and L. M. Tolbert. 2009. Traversing the "Top-Down/Bottom-Up" Divide: Molecular-Scale Lithography of Self-Assembled Ribbons, *J. Am. Chem. Soc.*, **131**(2): 398–399.

Patents and other steps toward commercialization:

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