Tiny fractal trees for solar power

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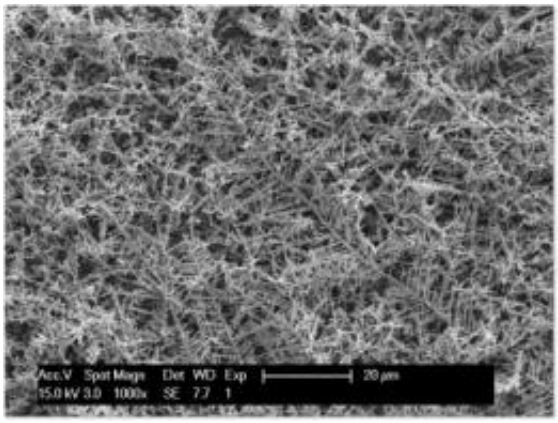

Fractal silver structures grown by electrochemical reduction of silver nitrate on a fluorine doped tin oxide film. These structures could be the basis of a new type of solar cell. Credit: Frank Osterloh, UC Davis

Microscopic "fractal trees" grown from silver could be the basis of a new type of solar cell, say chemists at the University of California, Davis.

"We expect these structures will allow us to make better, more efficient solar cells," said Professor Frank Osterloh, a principal investigator on the $100,000 grant.

Fractals are patterns that repeat over multiple length scales. In this case, branches of silver 1-50th the width of a human hair are themselves branched, and smaller branches grow on those branches, forming a treelike pattern.

In a solar cell application, the silver trees are coated with light-absorbing polymers. When light particles (photons) hit the polymer coat, they produce short-lived electrons and holes in the polymer. The positively charged holes are collected through the silver branches, while the electrons move to the counterelectrode to create an electrical potential.

Osterloh compared the structures to real trees, which use a fractal structure of branches to twigs to spread a wide canopy of leaves for sunlight collection. Similarly, the nanosized silver trees will have a large surface area.

Osterloh's lab at UC Davis will fabricate the solar cells, which will be characterized by collaborators Sean Shaheen at the University of Denver and Richard Taylor, University of Oregon. Boaz Ilan, UC Merced, will carry out computer modeling on the systems.

Provided by University of California - Davis

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