

US scientists Dr. Wong produce 'mega-molecules' of semiconducting materials

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Scientists have published details of a "breakthrough" method for producing quantum dots - molecular specks of semiconductors - which they believe could pave the way for better and cheaper solar panels.

The research at Rice University's Center for Biological and Environmental Nanotechnology (CBEN) appears this week in the journal **Small**.

The scientists describe a new chemical method for making four-legged cadmium selenide quantum dots, which previous research has shown to be particularly effective at converting sunlight into electrical energy.

Quantum dots are "mega-molecules" of semiconducting materials that are smaller than living cells.

They interact with light in unique ways to give off different-coloured light or to create electrons and holes, due partly to their tiny size, partly to their shape and partly to the material from which they are made.

"Our work knocks down a big barrier in developing quantum dot-based photovoltaics as an alternative to the conventional, more expensive, silicon-based solar cells," said paper co-author and principal investigator Michael Wong, assistant professor of chemical and biomolecular engineering at Rice. Wong explained that one way towards cheaper solar cells is to make them out of quantum dots.

Previous research by others has shown that four-legged quantum dots, or tetrapods, are many times more efficient at converting sunlight into electricity than regular quantum dots.

Wong said "until now there was no efficient way of producing tetrapods. Current methods lead to a lot of particles with arms of uneven length, crooked arms and even missing arms. Even in the best recipe, 30 per cent of the prepared particles are not tetrapods", Wong explained. CBEN's formula, which was developed by Wong and graduate student Subashini Asokan with CBEN director Vicki Colvin and graduate student Karl Krueger, produces same-sized particles in which more than 90 per cent are tetrapods. Significantly, these tetrapods are made of cadmium selenide which have been very difficult to make until now.

"One of the major bottlenecks in developing tetrapod-based solar cell devices has been removed, namely the unavailability of high-quality tetrapods of the cadmium selenide kind," said Wong.

