Light nanofilter system worth its weight in gold and silver

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(Phys.org) —In a breakthrough described by one international expert as 'a wonderful piece of lateral thinking', a team of researchers from The University of Western Australia has helped develop a novel nanoparticle light filter system that stimulates the growth of useful microalgal organisms.

The resulting microalgal cells and their light-absorbing photopigments provide high value-added chemical compounds which could lead to environmentally sustainable applications including biofuels, medical antioxidants and anti-inflammatory agents, natural food and soap colorants, cosmetic agents, and feed supplements in aquaculture.

"Hence, their large-scale economic production is commercially desirable," the researchers wrote in a paper published recently in the prestigious Royal Society of Chemistry journal, *Green Chemistry*.

Research Assistant Professor Ela Eroglu and Dr Paul Eggers working with Winthrop Professor Steven Smith, of UWA's School of Chemistry and Biochemistry and ARC Centre of Excellence in Plant Energy Biology - and with Flinders University clean technology expert Professor Colin Raston - developed a passive way of using minute, reusable gold and silver particles to create an optical nanofilter which harnesses the light wavelengths most beneficial to microalgal pigment formation.

Algae grow in natural light but too much light, or certain wavelengths of light, can inhibit its growth. The researchers used the nanoparticles to 'extract' only those wavelengths which the algae could use, resulting in improved growth.

"While commercial application is a long way off, this research shows that algal productivity can be improved using advances in nanotechnology," Dr Eroglu said.

The research ties in with an increasing worldwide interest in the use of microorganisms, including microalgal cells, for production of bioenergy and biomass. Bioenergy production offers many potential opportunities such as for energy supply to rural communities, while biomass production is useful for animal feed and the chemical and pharmaceutical industries.

"Perhaps even more exciting is the potential to use such nanofilters in artificial photosynthesis systems - the 'Holy Grail' of Green Chemistry - in which solar energy would be used to split water into oxygen and hydrogen for fuel," Professor Smith said.

More information: pubs.rsc.org/en/content/articl … f/2013/gc/c3gc41291a

Provided by University of Western Australia