

Unique bipolar compounds enhance functionality of organic electronics

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Researchers often work with a narrow range of compounds when making organic electronics, such as solar panels, light emitting diodes and transistors. Professor Tim Bender and Ph.D. Candidate Graham Morse of University of Toronto's Department of Chemical Engineering and Applied Chemistry have uncovered compounds that exhibit unique and novel electro-chemical properties.

"Organic solar cell need to absorb light, move electrons and transport holes. Normally you need one compound to do each function. Researchers have found compounds that can do two of the three. Our discovery leads to the potential of achieving all three with a single compound," explains Bender.

During the summer of 2010, Bender gave Morse the very broad task of assessing new compositions of matter. Morse proposed a research hypothesis that led to the discovery of a new class of compounds with phthalimido molecular fragments. Along with fellow U of T collaborators, the pair have shown that their new compounds present the ability to move both holes and electrons in an organic light emitting diode (OLED). Given these compounds absorb sunlight as well, they have the potential to execute all three tasks needed for a functional organic solar cell. Bender and Morse are currently investigating this likelihood.

"Compounds with such electrochemical behaviour are very rare. The knowledge we developed will further an understanding of future

[compounds](#) and synthesis strategies," says Morse.

An important part of Bender and Morse's work was the use of inexpensive raw materials and scalable synthetic methods so their research could transition smoothly into the next steps for materials development and conceivably a commercial product.

The detailed findings of their study were recently published in [Applied Materials and Interfaces](#), an interdisciplinary journal designed to report on the function and development of new cutting-edge materials and their applications. The journal falls under the [American Chemical Society](#) - a top tier publisher in the field of chemistry and its application.

"Getting reported on by *Applied Materials and Interfaces* is an achievement in itself," says Bender.

Provided by University of Toronto Faculty of Applied Science & Engineering

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