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Technology Transfer Office

Colorado State University

Highly Efficient and General Fullerene Perfluoroalkylation Under Mild Conditions

Fullerenes (aka buckyballs) are a class of molecules, related to carbon nanotubes, containing multiple carbon atoms and an overall spherical shape (much like a soccer ball). Modification of the basic fullerene structure can result in materials with new and useful properties.

Researchers in the Department of Chemistry at Colorado State university have developed a new method of appending perfluoroalkyl groups to fullerenes using mild, homogeneous conditions suitable for a wide variety of perfluoroalkyl and perfluoro-benzyl substituents. This method is quite general and may be utilized on most fullerenes (including higher fullerenes, metallofullerenes, and heterofullerenes).

In contrast to other techniques, this method allows for straightforward control of the product composition by adjusting the reaction stoichiometry, providing for the first time a generic selective synthesis for various bis-perfluoroalkyl derivatives. No special equipment is required and scale-up has been shown to be straightforward. In fact, an economical general procedure for the large-scale preparation of bis-perfluoroalkyl derivatives of C_{60} fullerene from crude fullerene extract has already been successfully realized, with yields reaching 28-30%.

This technology may prove especially valuable for the organic photovoltaic and flexible electronics industry. The products of this reaction may have the potential to replace the widely studied PCBM (another fullerene derivative) frequently used in these industries for its properties as an electron acceptor. With the novel reaction developed at CSU, these fullerene products would offer a low cost, customizable alternative to PCBM and could quickly replace it as the industry standard.

Contact us for more information on this exciting, new technology.

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Patent Information
Patent pending.

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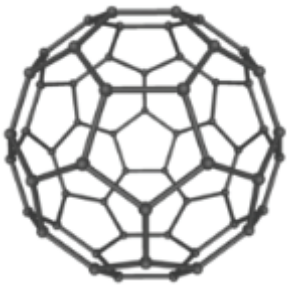
Related Technologies
09-094

Features and Benefits

- Improved general reaction for the perfluoroalkylation of fullerenes.
- Efficient, tunable, scalable, and cost-effective.
- Number and type of perfluoroalkyl groups easily controlled by reaction conditions.
- Potential for use within organic photovoltaic or flexible electronics industries.



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