C60 Buckminsterfullerene Derivatives for DNA-Encoded Libraries, Fullerene-Supported Synthesis, and High-Throughput Screening

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Buckminsterfullerenes exhibit remarkable reactivity compared to the chemistry of other carbon allotropes due to all double bonds being unconjugated. This leads to it being a super electron deficient polyolefin. It has been reported that C60 undergoes a AlCl3 catalyzed pseudo Friedel-Crafts reaction in neat benzene to give a product of fullerenated aromatics corresponding to the formula C60Hn(C6H5)n, where n is predominantly 12. Here is reported the formation of aromatic amine adducts in moderate yield, specifically 3-phenyl-1-propylamine and benzylamine, with C60 under similar conditions. These fullerene derivative shows particular promise for use in modified solid-phase synthesis (SPS) and DNA-encoded libraries (DEL) systems. Here is proposed a new method of integrating the combinatorial solid-phase synthesis of DNA-encoded libraries, the assay of small molecule ligands, and the sequencing of encoding oligonucleotides into one process; with the aid of amine-terminating fullerene derivatives and Illumina dye sequencing.

Awards Won:

Serving Society Through Science: First Award of $1000