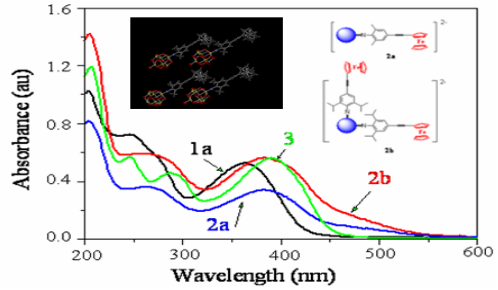
Electrically Active Organic-Inorganic Hybrid Materials

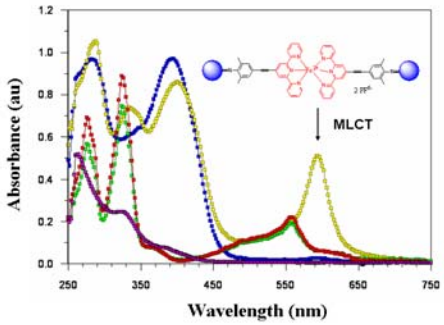
Zhonghua Peng, University of Missouri-Kansas City, DMR-0134032

Bringing vastly different structural and functional units together through covalent bonds is one of the most attractive approaches to obtain multifunctional materials or materials with unexpected synergistic properties. Here we present our successful preparation of a series of unprecedented hybrids where polyoxometalate clusters are covalently linked with organic conjugated π-systems to realize new electrically-active materials. These hybrids exhibit excellent thermal stability and exciting electrical/optical properties.

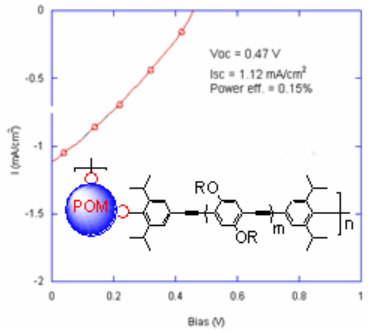
Angew. Chem. Int. Ed. Engl. 2004, 43, 930-935. Chem. Comm. 2003, 2562.

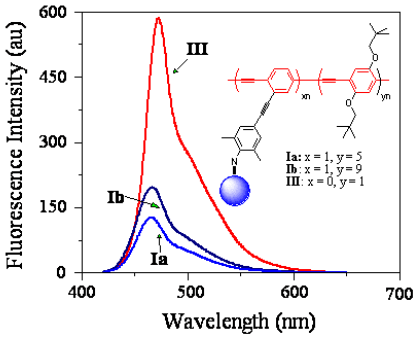


Charge transfer hybrids showing CT transitions around 480 nm.



A hybrid containing an Fe^{2+}-terpyridine complex and POMs linked with conducting bridges





Efficient single-layer PV cells fabricated from main-chain POM-containing hybrid polymers (left) and efficient fluorescence quenching observed for conjugated polymers with POM pendants (right).

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Education:

During the past year, two graduate students (Ms. Jeonghee Kang, 2nd year; Mr. Gavin Wang, 2nd year) and one post-doctoral scientist (Dr. Joy Guo) have been supported by this grant. Under this grant, one student has completed his Ph. D degree (Dr. Bubin Xu, IRIX Pharmaceutical Inc.) and one student is now preparing her Ph. D thesis (Ms. Meng Lu). Two undergraduates (James Nelson, Calida Cheung) and three high school students (Ms. La'chelle Bailey, Ms. Shelita Terrill, Mr. Jonn Brown) have participated in this project.

Outreach:

Each summer, the PI invites local high school students to participate in chemical research at the PI's laboratory. This program is supported by ACS-Project Seed and NSF. The picture below shows Jonn Brown, a high school junior preparing hybrids.