

# Jean-Marie Tarascon

## “Searching for Sustainable and ‘Greener’ Li-ion Batteries”

Lithium-ion batteries are strong candidates for powering upcoming generations of hybrid electric vehicles and plug-in hybrid electric vehicles. But improvements in safety must be achieved while keeping track of materials resources and abundances, as well as materials synthesis and recycling processes, all of which could inflict a heavy energy cost. Thus, electrode materials that have a minimum footprint in nature and are made via eco-efficient processes are sorely needed. The arrival of electrode materials based on minerals such as  $\text{LiFePO}_4$  (tryphillite) is a significant, but not sufficient, step toward the long-term demand for materials sustainability. The eco-efficient synthesis of  $\text{LiFePO}_4$  nanopowders via hydrothermal/solvothermal processes using latent bases, structure directing templates, or other bio-related approaches will be presented in this talk. However, to secure sustainability and “greenness,” organic electrodes appear to be ideal candidates, thanks to their environmental benefits: they can be synthesized via “green chemistry” from natural organic sources, are biodegradable, and are not resource limited. We took a fresh look at organic-based electrodes; the results of this research into sequentially metal-organic-framework electrodes and Li-based organic electrodes ( $\text{LixCyOz}$ ) will be reported and discussed.

**Jean-Marie Tarascon** is a professor at the University of Picardie (Amiens). Most of his career has been spent in the U.S., first at Cornell University (1980), then at Bell Laboratories, and at Bellcore until 1994. His field of research is in development of new techniques for synthesis of new electronic materials (superconductors, ferroelectrics, fluoride glasses, and rechargeable batteries materials) for new solid state electronic devices, and for relating crystal structure to electronic, optical, and magnetic properties. He made notable contributions in the field of superconductivity and was the original proponent of the thin and flexible plastic lithium-ion battery based on a strong, highly resistant hybrid polymer system that is now commercialized. As head of the Institute of Chemistry of Picardie and coordinator of the European Research Institute for battery research (ALISTORE-ERI), he is exploiting new Li reactivity concepts such as conversion or displacement reactions, and novel electrode designs for the next generation of Li-ion batteries based on nanoelectrode/electrolyte components. He is the author of some 60 patents and more than 450 publications, and the recipient of many awards, most recently the Volta Medal, the 2004 "ISI AWARD," nomination to the French Academy of Sciences in 2005, and the UPJV gold medal in 2008.

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