FROM MATERIALS INNOVATIONS TO NEW SUSTAINABLE BATTERY CHEMISTRIES

Tarascon J.M.
Collège de France, - UMR CNRS 8260, 11 Place Marcelin Berthelot, 75005 Paris, France
Réseau sur le Stockage Electrochimique de l'Energie (RS2E) - FR CNRS 3459, 80039 Amiens Cedex, France
jean-marie.tarascon@college-de-france.fr

Research's progresses in rechargeable batteries are driven by ever increasing demands for portable electronic devices as well as for powering electric vehicles and providing load-leveling for mass storage of renewable energy. Li-ion batteries are the systems of choice for the aforementioned applications. Therefore, for this to fully happen, new concepts and new sustainable chemistries are sorely needed, and this is what this presentation will address.

Firstly, regarding new concepts, we will show how the discovery of a new Li reaction mechanism that involves the anionic network with the reversible formation of dimers (O-O) represents a transformational approach for creating electrode materials with exacerbated capacities. Towards, higher energy density systems, recent advances on solid state Li batteries will be discussed. Concerning new chemistry, our new findings with the Na-ion chemistry which enlists novel materials/electrolyte designs together with the assembly of 18650 prototypes together with our work on Zn-MnO2 aqueous systems will be presented. Lastly, an indirect way to enhance simultaneously energy density and sustainability via the use of sensing and self-healing functionalities will be introduced. Through these examples, the importance of materials design will be emphasized together

Altogether, these examples have been selected to show that the future of battery offers new opportunities for materials scientists as long as we are willing to play with the Mendeleev table and explore new risky paths. .