

DE LA RECHERCHE À L'INDUSTRIE



RESEARCH CHALLENGES FOR POST LI-ION BATTERIES: EXPECTATIONS AND OPINIONS FROM CEA-LITEN

NMP17 Objective :

Develop an energy storage system matching the performance of current internal combustion vehicles

Develop **cost competitive** and **sustainable storage** technologies for Electrified Vehicles (EV) → **New chemistries**

- Energy density
- Power density
- Competitive cost
- Safety
- Work under severe thermal conditions
- Produced in environmental friendly way

**Best in class Li-ion
technology:
→ X2 energy density
→ same power density**

TRL 4



ZOE: 1st EV sold in France in 2013 with more than 5300 vehicles (64% of EV)

ZOE: 200 km autonomy

Research orientation to match **X2 in energy density**:
New electrode materials (5V, Li-rich, Si, ...) and
Alternative electrolyte formulations are needed

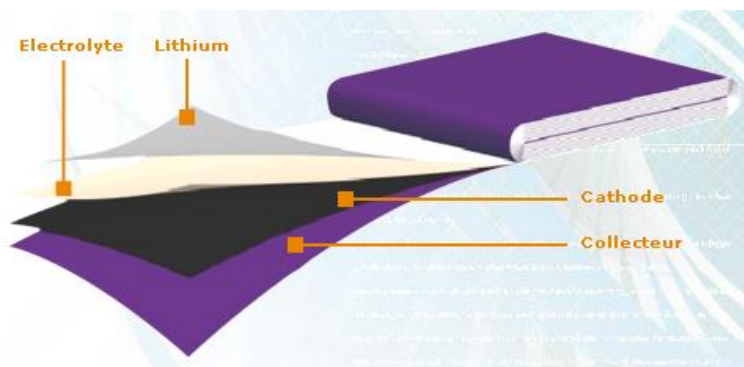
Safety and **ageing** are two main issues

Battery pack: 100 Wh/kg, 100 Wh/l
Autonomy: 200 km
Li/PEO/LiFePO₄ battery

Working temperature 80-90°C



More than 2000 bluecar sold in 2012-2013

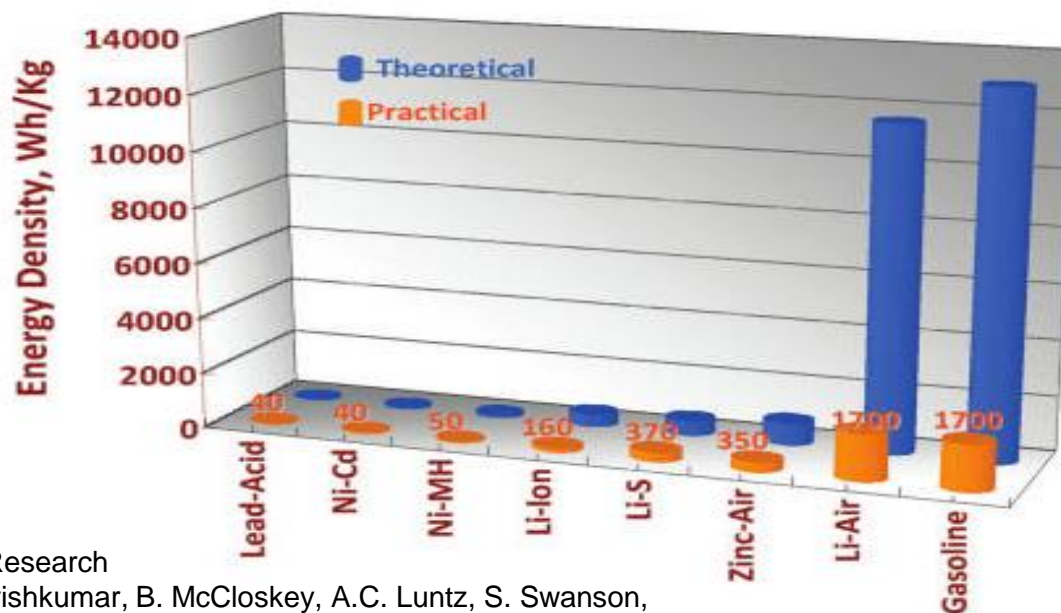
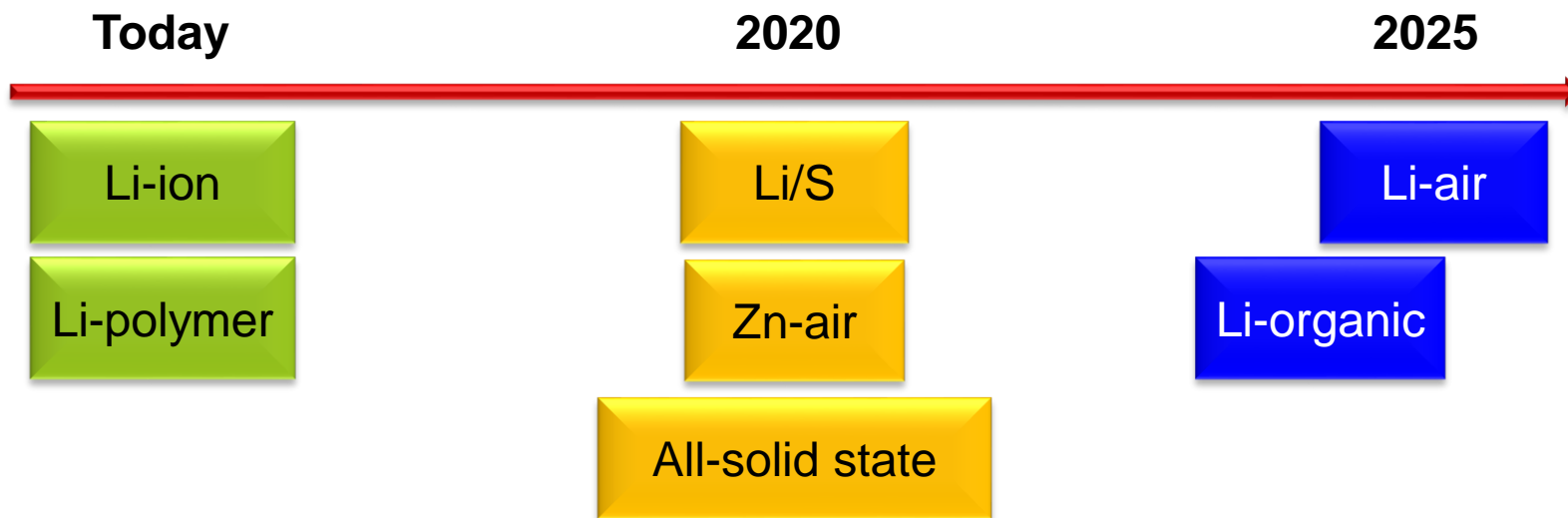


Good safety due to polymer electrolyte and choice in positive electrode material



Improvement of electrolyte is needed in order to decrease T°C, as well as positive electrode materials with **higher potential and capacity**

Post Li-ion technologies



IBM Research
G. Girishkumar, B. McCloskey, A.C. Luntz, S. Swanson,
W. Wilcke, *J. Phys. Chem. Lett.*, **1** (2010) 2193-2203

Post Li-ion technologies - Expectations

	Li-ion	All-solid state - Gen2 -	Li/S	Zn-air	Li-air
Density Wh/l				?	?
Density Wh/kg (Cell level)	200			?	?
Cyclability	2000	2000+	500	500	
Cost					
Safety					
Environmental impact		To be assessed			
TRL	6-9	3-4	3-4	3-4	3

External system (pump, ...)

Abuse conditions?



liten

Thank you for your
attention!

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