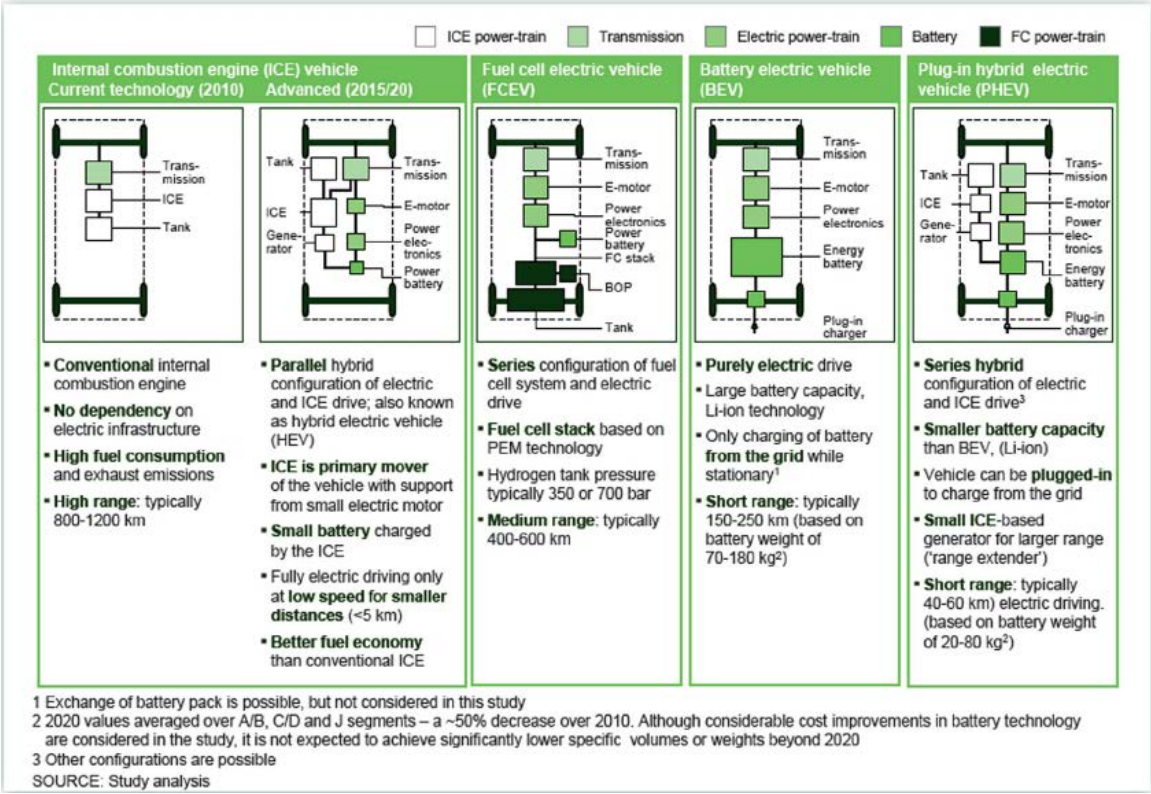
種々存在する電動車両のなかで、どの方式が有望と考えるか？
その理由等も含め、自分の意見を述べよ。

The main topic of class brought by Prof. KAMIYA is about eco-friendly electric vehicle. The professor introduce us battery electric vehicle, plug-in hybrid electric vehicle, fuel cell vehicle which has been developed in recent years. And some excellent products as LEAF, i-MiEV, BMW i3, Eliica, etc.

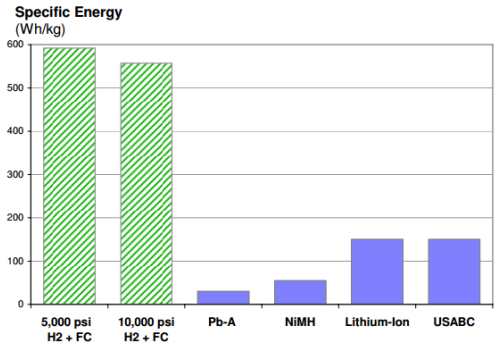


[Fic-1 Structures of ICEV, FCEV, BEV and PHEV]

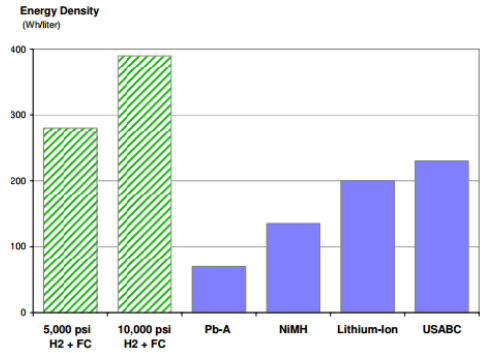
The professor also introduced us research trends in this field, such as BEV and PFCV (Plug-in Fuel Cell Vehicle).From my point of view, PFCV, which combine the Battery electric technology and Fuel cell technology, is more promising, because of following reason:

1, High Energy Density

[Fig-3] compare the specific energy of hydrogen and fuel cell systems with the specific energy of various battery systems. By the meantime, [Fig-4] compared energy density of hydrogen tanks and fuel cell systems compared to the energy density of batteries, thus PFCVs much light and small than same power BEVs, which is also means high Will-to-Wheel Efficiency.



[Fig-3] Compare PFCV with BEV in Specific Energy



[Fig-4] Compare PFCV with BEV in Energy Density

2, More Efficiency & Environmental Friendly

Since majority of electricity in the world comes from coal, and the grid efficiency is on the order of only 35%, BEVs would lead to much more greenhouse gas emissions than PFCV, as most hydrogen was made by reforming natural gas.

3, Faster Supplementary Time

As battery charging is a long chemical reaction progress take at least 1~2 hours, PFCV's refuel progress is just a few minutes in hydrogen supply station. What's more, Hydrogen supply could base on current fossil energy supply system.

Reference:

1, Josh Goldman, Comparing Electric Vehicles: Hybrid vs. BEV vs. PHEV vs. FCEV [OL], Union of Concerned Scientists.

2, Sandy Thomas, Fuel Cell and Battery Electric Vehicles Compared [J]. International journal of hydrogen energy, 2009, 34(15): 6005-6020.