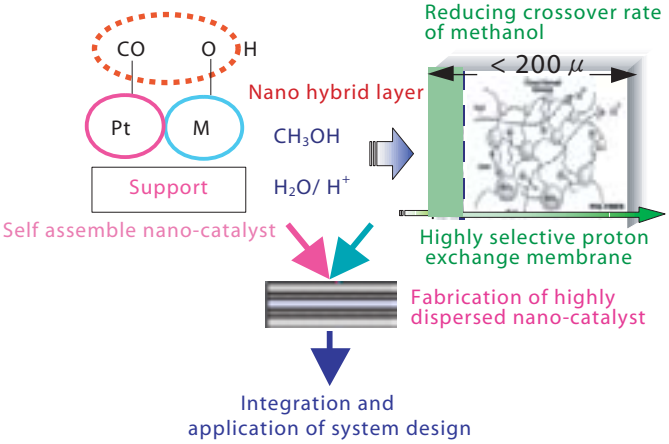
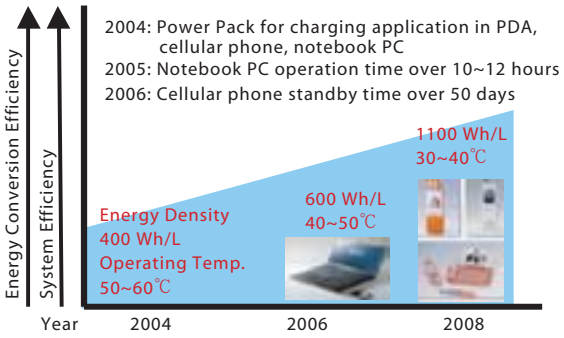
Direct Methanol Fuel Cells
直接甲醇微型燃料電池

Direct methanol fuel cell (DMFC) is one of the proton exchange membrane fuel cells. Polymer materials serve as exchange electrolyte while methanol is the fuel. ITRI is setting sights on a wide range of untethered applications, and targeting for 12 hours of continued notebook PC operations by 2005 and 50-day standby capabilities for cellular phone applications by 2006. ITRI has made significant advances in the areas of nano-catalyst formulation, separation membrane, membrane electrode assembly (MEA), cell and stack design. The prototype of a new handset is completed.

直接甲醇燃料電池（Direct Methanol Fuel Cell, DMFC）是屬於質子交換膜型燃料電池的一種，以高分子材料為質子交換用的電解質，不用氫氣而用液態甲醇作為電池燃料。工研院目前在奈米觸媒、質子傳導膜、膜電極等技術已取得關鍵突破。預計2005與2006年分別完成筆記型電腦連續運轉10~12小時及手機待機50天的燃料電池開發。





2003/05

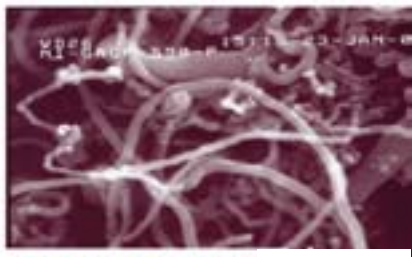
Technology Achievement

- Developing of designing patents of single cell and fuel cell stack. New cell and stack design eliminates many Membrane Electrode Assembly (MEA) defects and reduces system complexity, and led to new assembling procedure suitable for mass production.
- Developing of MEA material and current collector technology. Cell stack uses 10% methanol solution as fuel (482 Wh/l energy density). At room temperature, output power of single MEA reaches 10 mW/cm^2, 40 mW/cm^2 at 60˚C. Stack power density is around 35 mW/cm^3.

Catalyst Activity

Catalyst 02-DMFC-CAT-	Support 02-DMFC-CAT-	Precursors	Method	Loading (wt %)			Ru/Pt	Current Density mA/Pt-Ru (mg)	Particle Size (nm)
				Total	Pt	Ru			
E.TEK	XC-72	--	--		26.30	13.50	1.0	112.5	2.5
JM-H7000	XC-72	--	--	45	30	15	1.0	168.6	2.2
UCL-P10-1	XC-72	Pt and Ru salt	IW[a]	31.85	20.97	10.88	1.0	141.7	2.7
UCL-P35-1	CNT/CF	Pt and Ru salt	IW	29.97	19.75	10.22	1.0	218	--

a:incipient wetness (Co-impregnation of Pt-Ru)



SEM of CNT/CF 2003/03

TEM of Pt-Ru/CNT/CF

Applications

PDA, Cellular phone, Notebook PC...