

### **361b High Performance of Direct Methanol Fuel Cell with Double Walled Carbon Nanotubes Film Supported PtRu as Anode Catalyst**

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In this presentation, we used a polyol method to prepare 3 types of CNTs (SWNTs, DWNTs and MWNTs) supported PtRu electrocatalysts. XRD and TEM characterizations shows PtRu nano-particles with a very small particle size and shallow size distribution (2-3 nm) are dispersed onto CNTs uniformly. A modified filtration method was employed to prepare compact PtRu/CNTs film as anode catalyst layer for DMFC. The compact layer has a uniform thickness of 7-8  $\mu\text{m}$  for MWNTs and 15-20  $\mu\text{m}$  for DWNTs. In RDE test, PtRu/DWNTs exhibits an exceptional high methanol oxidation specific activity compare to PtRu/MWNTs and PtRu/XC-72 samples. The compact MWNTs and DWNTs film based MEAs show better DMFC performance than the traditional MEA. This is probably attributed to its higher specific activity towards methanol oxidation reaction and compact film structure, which offers a good mixture with Nafion and will facilitate methanol transportation. The DMFC with a compact PtRu/DWNTs (50wt%) film with a PtRu electrode loading of 0.34  $\text{mg}/\text{cm}^2$  have the highest power density of 131  $\text{mW}/\text{cm}^2$ , which is 68 % higher than the traditional MEA with a PtRu metal loading of 2.0  $\text{mg}/\text{cm}^2$ .