

**Can every Pt atom be utilized in  
FC electrodes?**

Radoslav Adzic  
Brookhaven National Laboratory

# Pt utilization in FC

## **Electroactive Pt: Loss of utilization in the MEA**

- *In the free catalyst: 80 m<sup>2</sup>/g Pt (CV of catalyst on a GC electrode) \**
- *In the MEA: 30-40 m<sup>2</sup>/g Pt (from CV in a MEA)*
- *Only 37 to 50 % of the Pt surface atoms are electrochemically active in the catalyst layer*

## **Pt particles in C supported Pt catalysts: Loss of utilization in the particle**

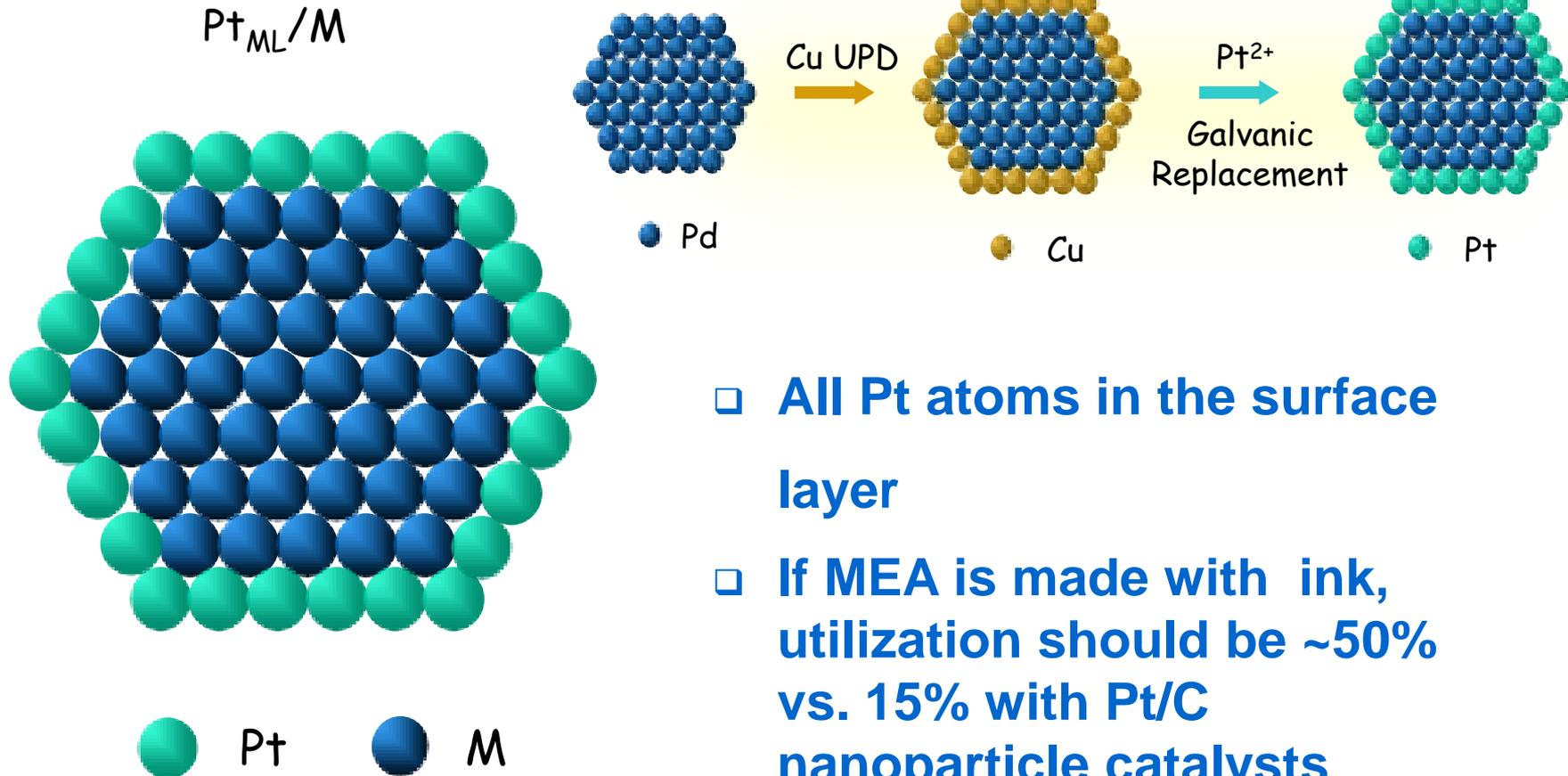
- *Pt atoms in the surface: 26 % \**
- *3/4 of the atoms in the particle are not available for catalysis*

\* T.J. Schmidt et al. JES, **145**, 2354 (1998)

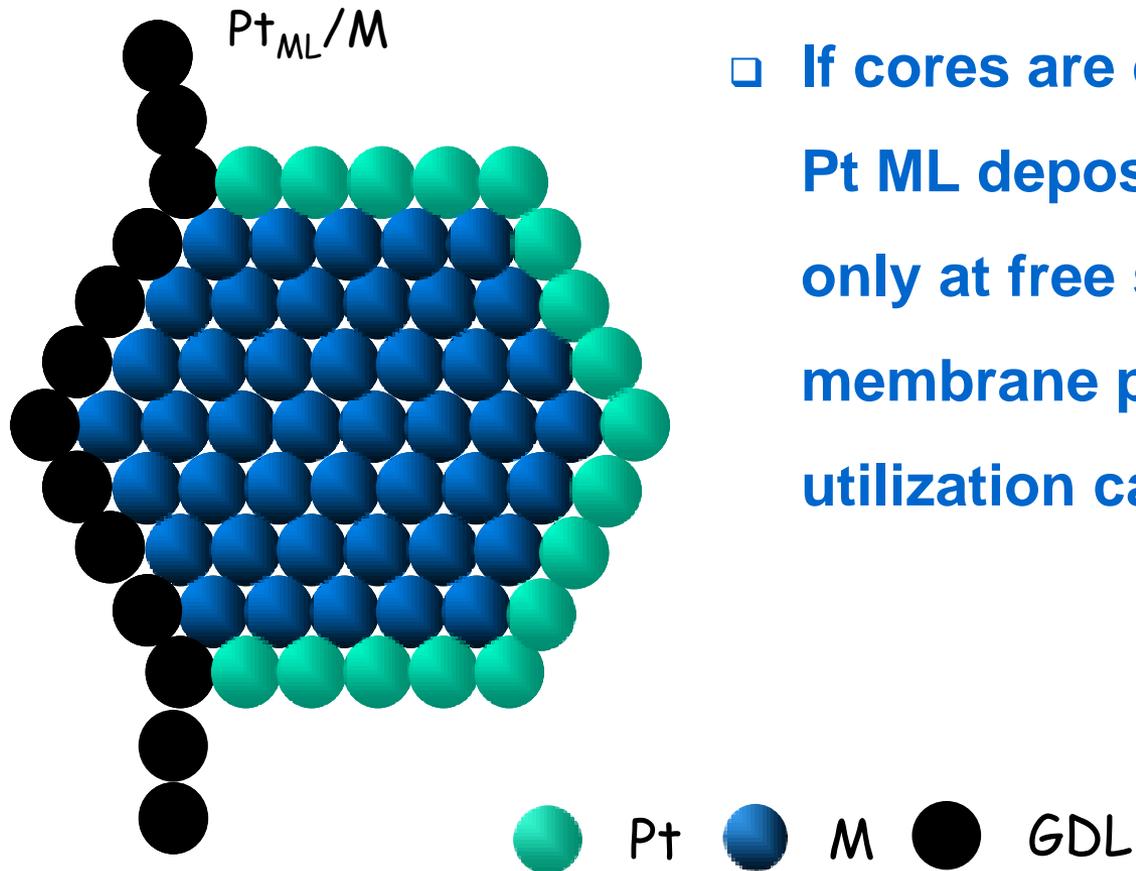


2 - 5 nm

# Pt Monolayer Electrocatalyst



# Pt Monolayer Electrocatalyst



- If cores are deposited at GDL, Pt ML deposition can take place only at free sites, followed by membrane pressing, ~ 100% Pt utilization can be expected.