Electroplated metal nanotube arrays as electrocatalysts for methanol electro-oxidation

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Direct methanol fuel cell (DMFC) has attracted a lot of interests since it might be widely used in energy industry and less toxic. And Pt-based catalysts were the most accepted electrocatalysts for methanol oxidation in DMFC. It has been reported that Pt-Ru or Pt-Ni nanostructures show better catalytic ability than commercial Pt/C catalyst. Some researchers also reported Pd nanowire as methanol electro-oxidation catalyst in alkaline solution. However, metal nanotube structures, which maintain a large surface-to-volume ratio and a big catalytic potential, have not been studied much yet.

In this work, we fabricated Pd/Pt nanotube arrays by electroplating process. Anodic aluminum oxide (AAO) membrane was used as template to confine the morphology of these nanostructures. Electrocatalyst studies were carried in both alkaline and acid environments and measured by cyclic-voltammetry scanning method. A result compared the catalytic performances among Pd/Pt nanotube, nanowire arrays and Pd film will also be presented.