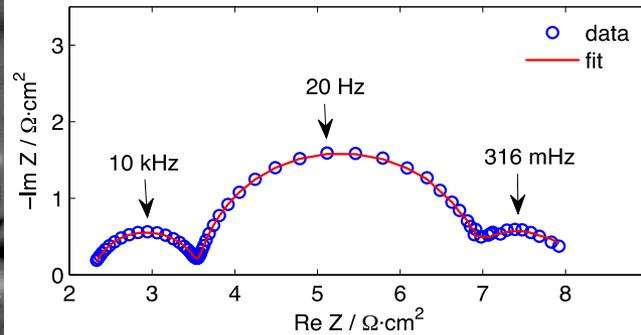
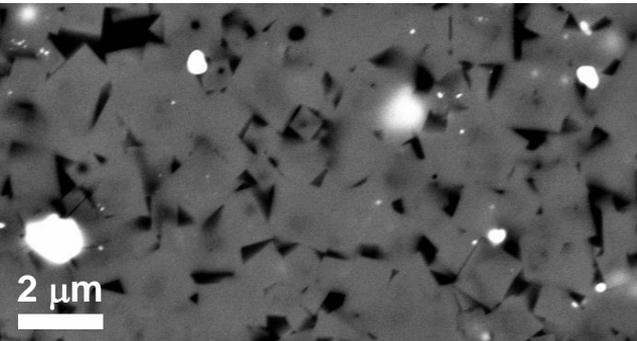


Exceptional service in the national interest



Electroless Process for Depositing Tungsten Metal for Sodium Battery Electrodes

Leo J. Small, Paul G. Clem, Erik D. Spoeerke

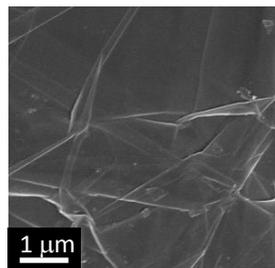


DOE Office of Electricity Delivery and Energy Reliability Peer Review
Sept. 26-28, 2016, Washington, DC

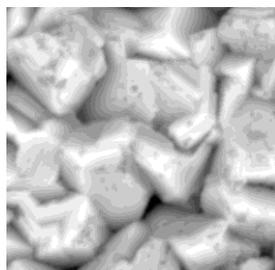


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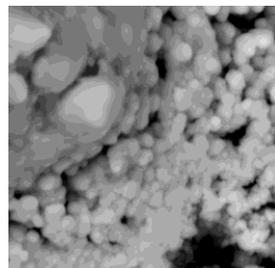
Electrolessly Coated Tungsten Electrodes



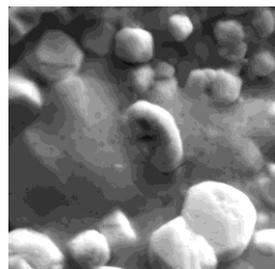
Carbon electrode
(graphite, powder, foam)



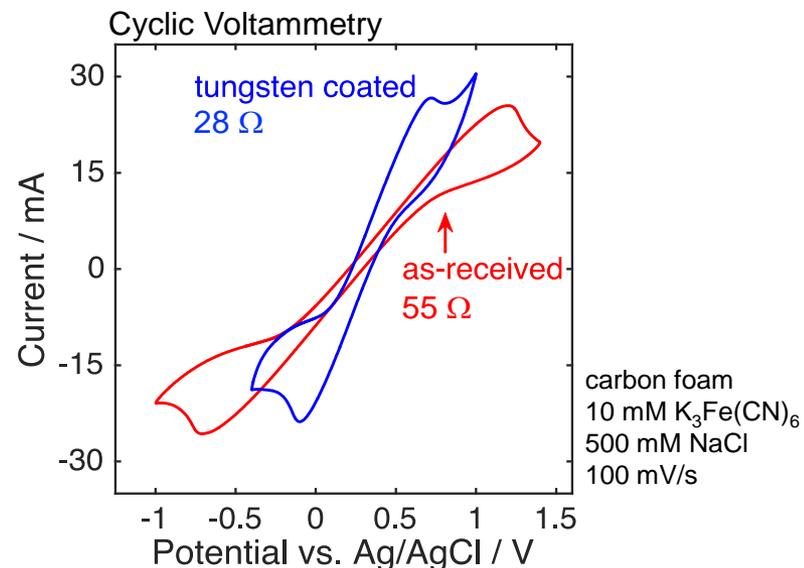
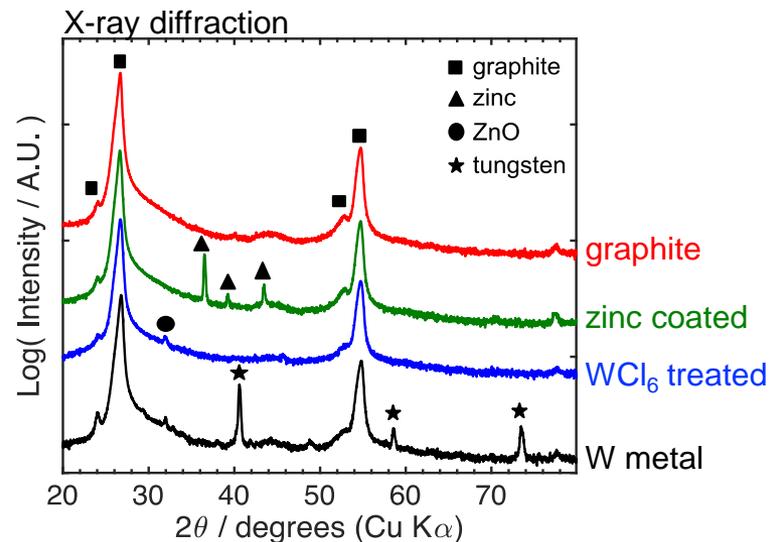
Electroplate with zinc.



Treat with WCl_6 in ether.



800 °C for 3 h in 3% H_2 in N_2 .
Crystalline, metallic tungsten.



High conductivity, corrosion-resistant tungsten coating enables superior electrochemical performance.