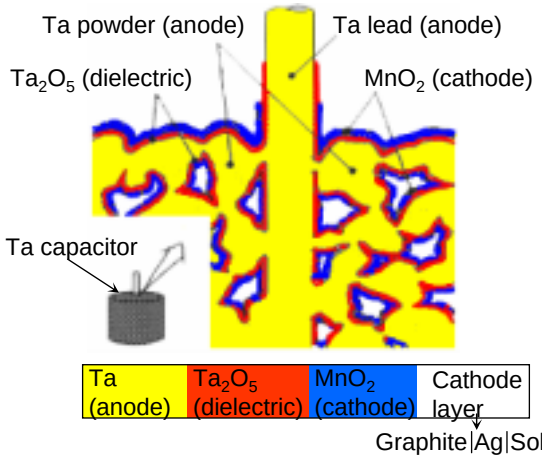
New Niobium/Tantalum Production Process

Electrochemical Pulverization of Bulk Metal for Producing Fine and Highly Pure Ta and Nb Powders

Background & new process

Background

Tantalum (Ta) capacitors have the largest capacity per unit volume, and they are thermally stable. The anode of a Ta capacitor is fabricated using Ta powder, which is very expensive primarily due to limited Ta resources.



Recent trend in the miniaturization of electrical appliances has increased the demand for high performance Ta capacitors. If the abundant and cheap Nb can substitute Ta for capacitors, Nb capacitor has the potential to become the next generation capacitor.

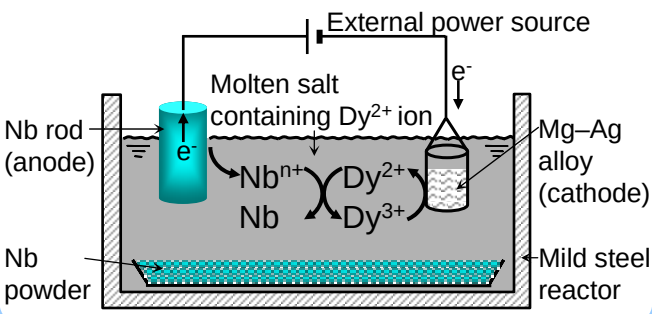
New process: Electrochemical Pulverization (EP)

Anode: Nb (bulk) → $Nb^{n+} + n\,e^-$
(Anodic dissolution of Nb rod)

Cathode: $n\,Dy^{3+} + n\,e^-$ → $n\,Dy^{2+}$
(Regeneration of Dy^{2+} ion, reductant)

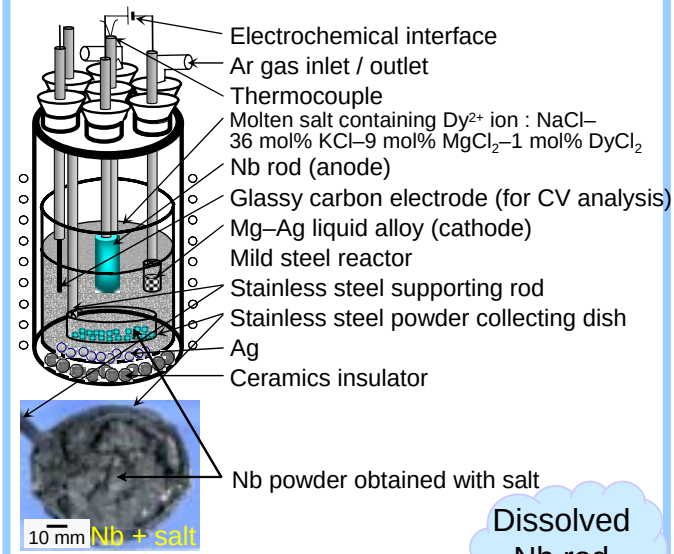
In molten salt: $Nb^{n+} + n\,Dy^{2+}$ → Nb (powder) + $n\,Dy^{3+}$
(Reduction of Nb^{n+} ions)

Overall reaction: Nb (bulk) → Nb (powder)

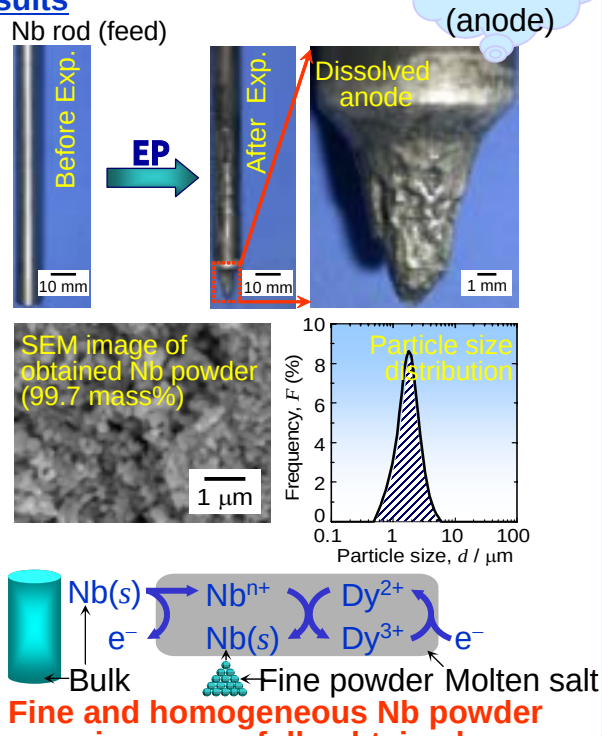


Experimental & results

Experimental apparatus



Results



Fine and homogeneous Nb powder is successfully obtained

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