

# Low Energy Nuclear Reactions on the Cathode of a Chemical Cell



New Energy Times Archives

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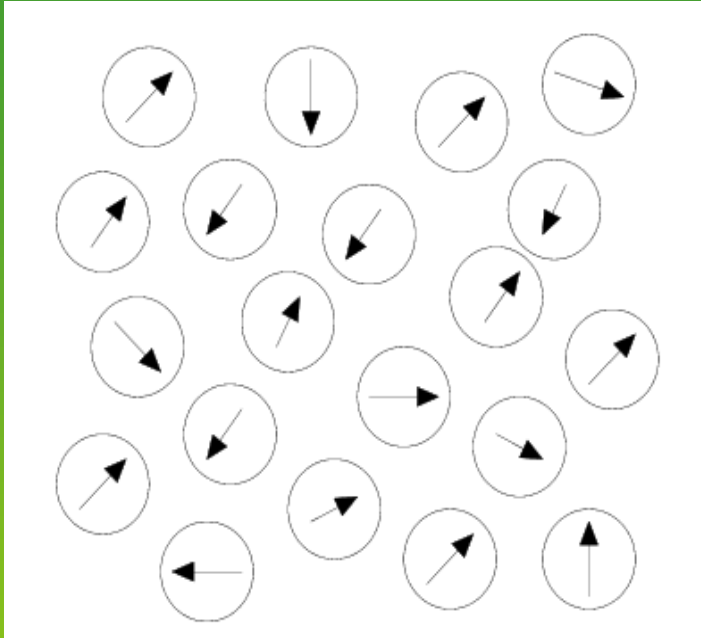


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# Contents:

- **Two Kinds of Water**
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- **Conclusions**

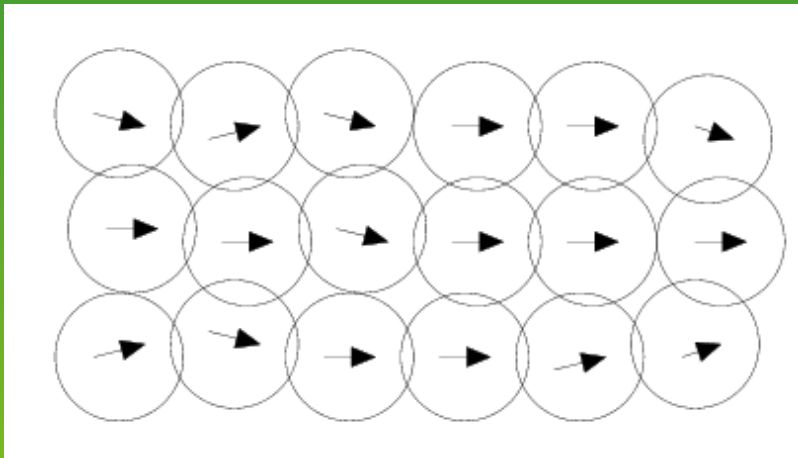
# Two Phases of Water I:



**Bulk Water is a Fluid Colloidal Suspension of Polarized Domains Floating Within a Background of Normal Water with no Net Ordered Polarization.**

**Skim Milk is a Dilute Colloidal Suspension of Fat Domains in Bulk Water**

# Two Phases of Water II:



**Interfacial Water is a  
Liquid Crystal Ferro-  
electric Wherein  
Overlapping  
Polarized Domains Yield a  
Net Polarization**

**Cream is a Dense Colloidal Suspension  
of Fat Domains in Bulk Water**

# Two Phases of Water III:



**Milk from a Cow  
Phase Separates  
into Cream  
Floating on Top of  
Skim Milk.**

# Two Phases of Water IV:



**Interfacial Water  
Floats on Top of the  
Normal Water  
Emulsion and a  
Copper Coin Floats  
on Top of the  
Interfacial Water**

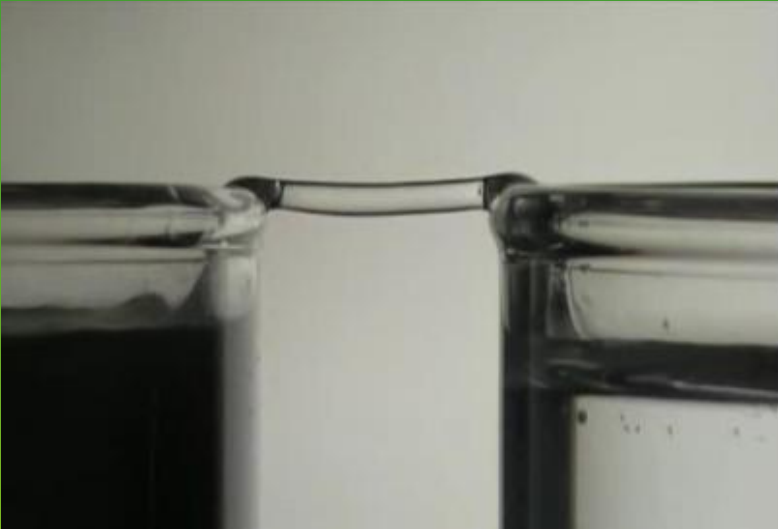
# Two Phases of Water V:



A Bulk Water Droplet Floats on an Interfacial Water Layer Which in Turn Floats on Top of the Bulk Water Emulsion. The Droplet Remains Floating for Seconds of Time Before Suddenly Falling Down into the Water.

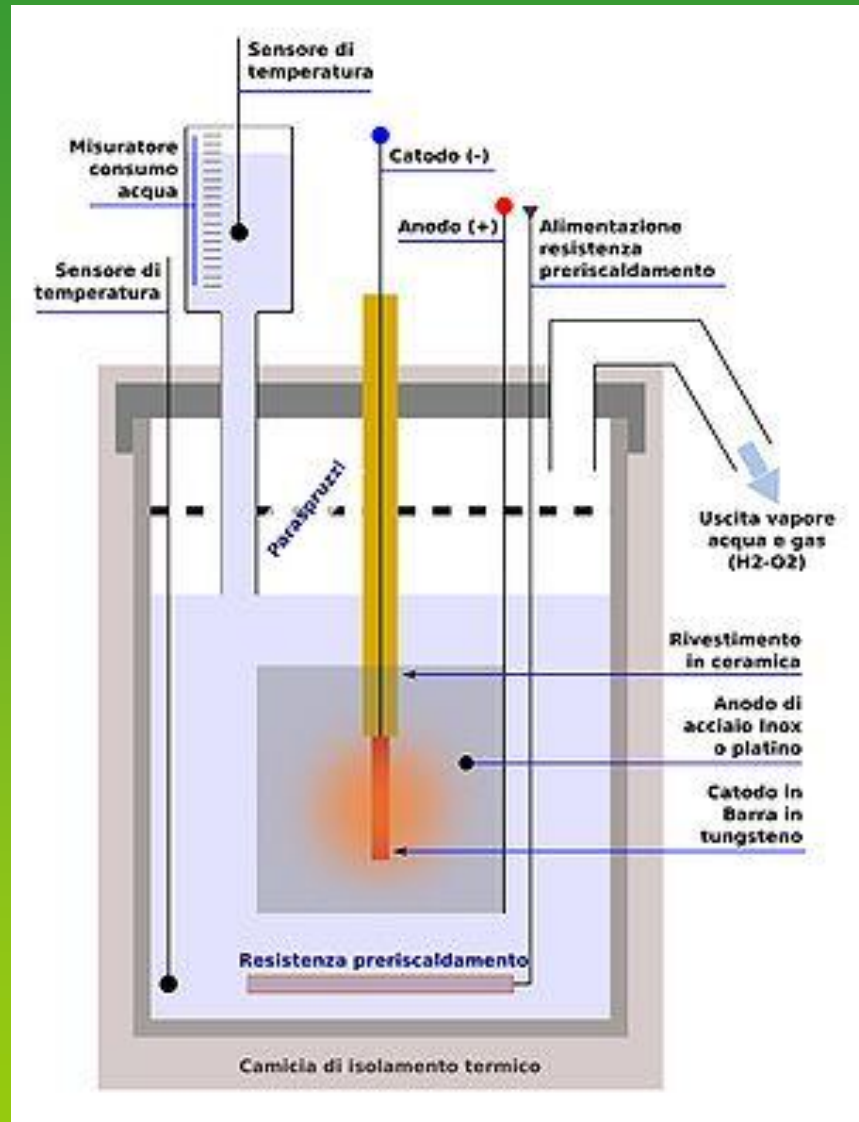


# Two Phases of Water VI:

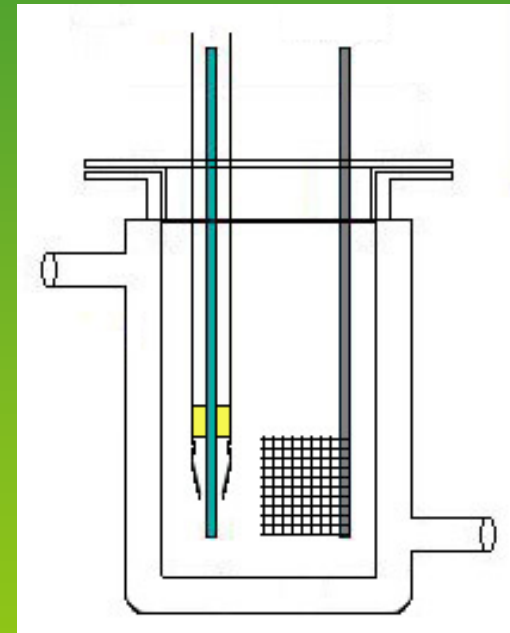


Formation of a Water Bridge Across Two Glass Containers. The Container with the Lower Level Has the Cathode while the Container with the Higher Level has the Anode.  $V$  is about 15 kilovolt. Water lowers its chemical potential per unit mass  $\Delta\zeta=gh$  when storing electronic negative charge .

# Cathodes I:

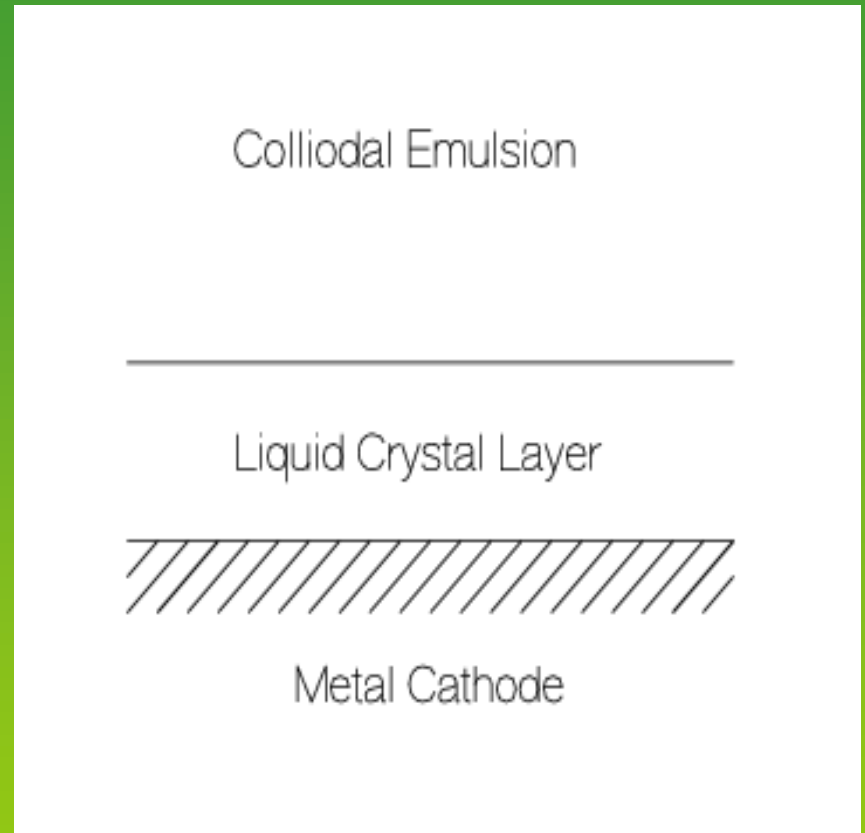


# Cathodes II:



# Cathodes III:

**Liquid Crystal Interfacial Layer Stores Negative Charged Electrons Pushing Protons Into the Metallic Cathode Making a Metal Hydride and Pushing Positive Ions into the Bulk Water.**



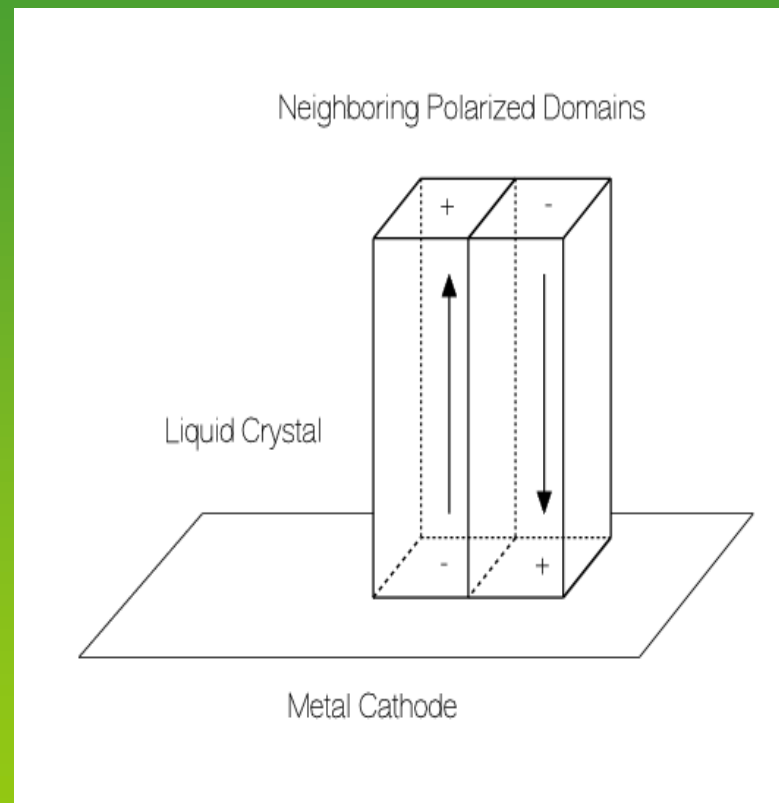
# Cathode IV:

For zero electric field,  
the ferroelectric state  
has neighboring  
polarization domains  
leave a configuration  
on the cathode of

**+ - + - + - + - + -**

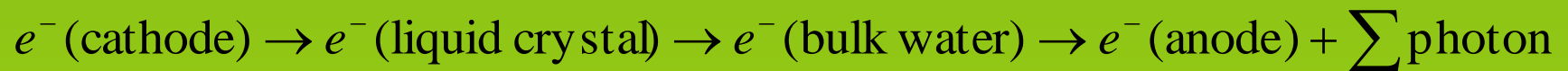
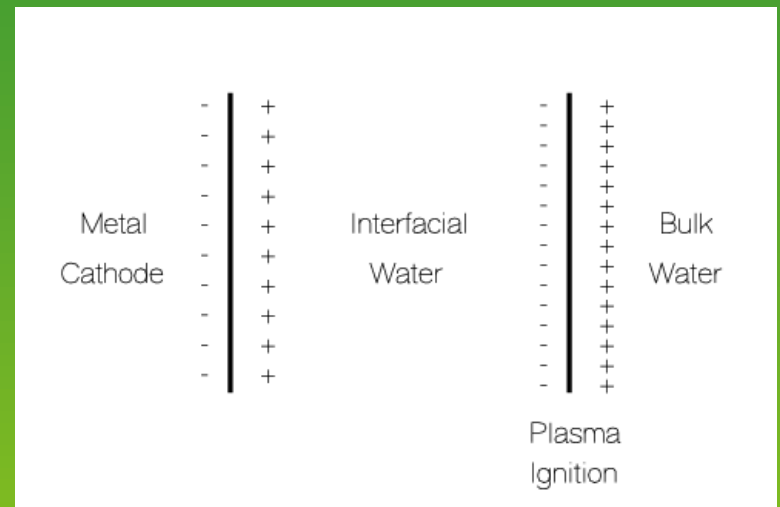
For strong electric fields,  
the downward polarization  
leaves only positive charges

**+++++**



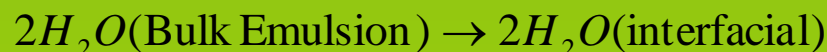
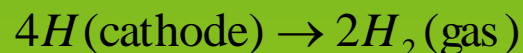
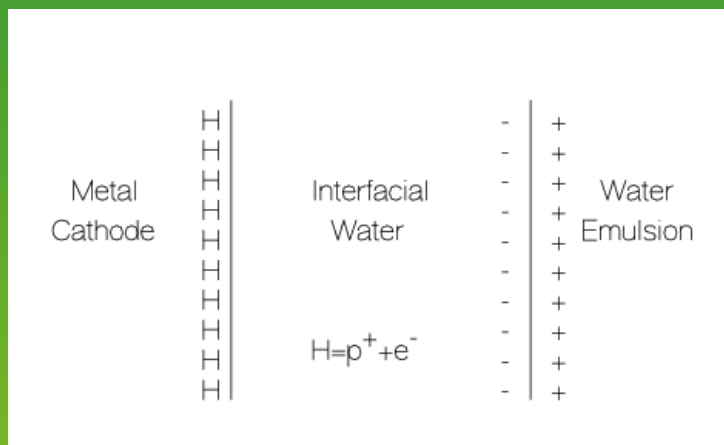
# Cathode V:

The - + charged ion pairs on the Interfacial water bulk water surface annihilate leaving a neutral molecule while another Electron runs from the cathode to replace the lost electron. The neutral object then ionizes radiating optical photons. The ionized electron then makes it through to the anode yielding



$$eV = \sum \hbar\omega \quad (\text{plasma glow discharge})$$

# Electrolysis I:



# Electrolysis II:



**Faradays Law :For every 4F of charge which passes through the cell, two moles of hydrogen gas and one mole of oxygen gas will be produced**

**F=96,485 Coulomb**





# Glow Discharge I:



$e^-$  (cathode)  $\rightarrow e^-$  (liquid crystal)  $\rightarrow e^-$  (bulk water)  $\rightarrow e^-$  (anode) +  $\sum$  photon

$$eV = \sum \hbar\omega \quad (\text{plasma glow discharge})$$

# Glow Discharge II:

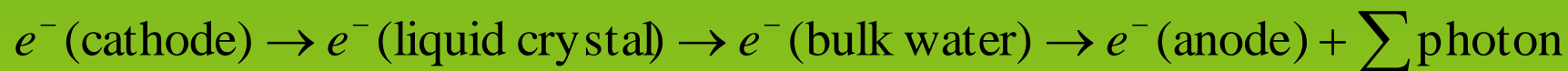


~220 Volt

~100 Volt



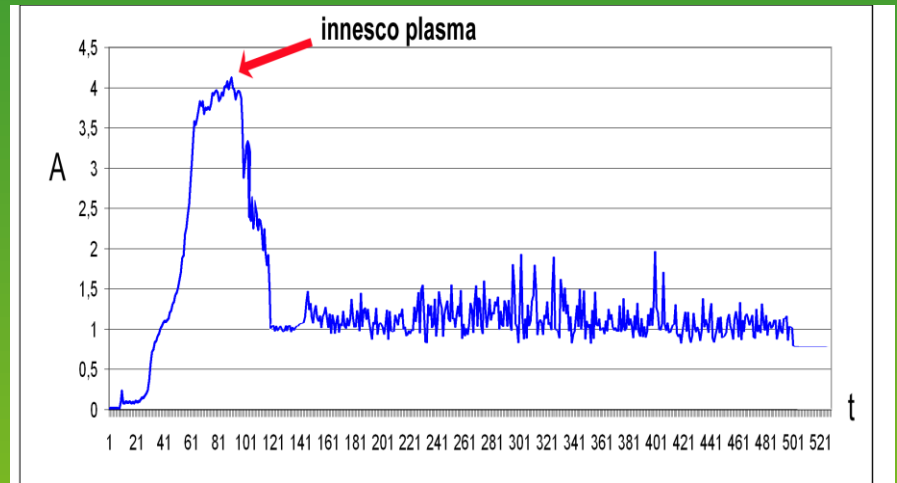
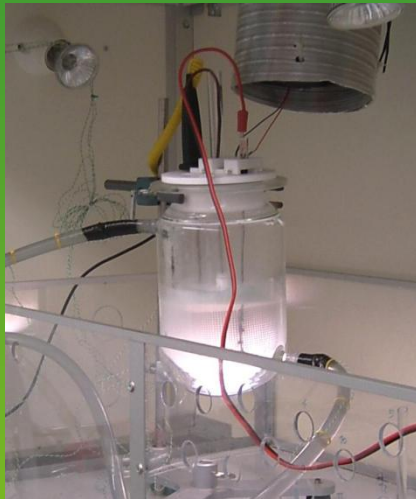
**Radiation Subtracts  
From Faraday's Law**



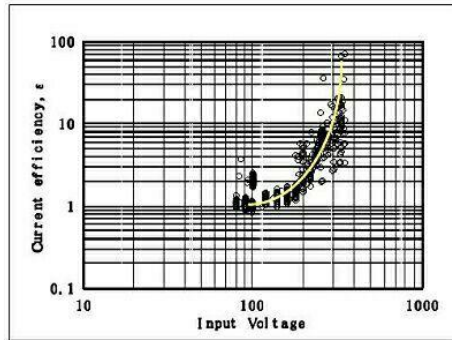
$$eV = \sum \hbar\omega \quad (\text{plasma glow discharge})$$



# Glow Discharge III:

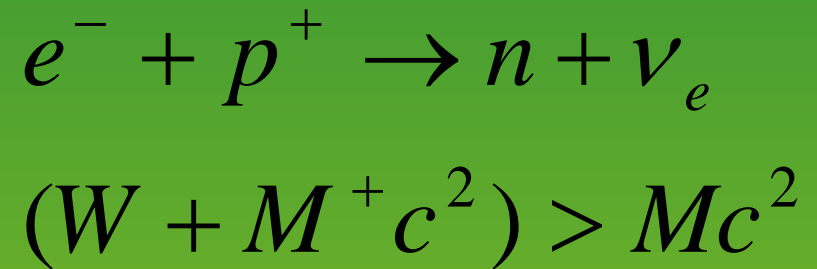


Plasma  
W electrode 1.5  $\phi$ , 30mm  
220V, 1.2A, 90C  
Current efficiency; 500%



# Nuclear Transmutations I:

Important Physics Requires  
Production of Neutrons by  
Weak Interactions



$$W = \sqrt{m^2 c^4 + \overline{p^2} c^2} \quad \frac{dp}{dt} = eE$$

$$\overline{p^2} = e^2 \int_0^{\infty} S_{EE}(\omega) \frac{d\omega}{\omega^2} = \frac{\overline{E^2}}{\Omega^2}$$

# Nuclear Transmutations II:

The glow discharge excites surface plasma modes  
At mean frequency  $\Omega$  which in turn yields a fluctuating electric  
Field  $E$ . These quantum electrodynamics fluctuations  
renormalize the electron energy.

$$e^{-} + p^{+} \rightarrow n + \nu_e$$

$$(W + M^{+}c^2) > Mc^2$$

$$W = mc^2 \sqrt{1 + \frac{e^2 \overline{E^2}}{m^2 c^2 \Omega^2}} = mc^2 \beta$$

$$\beta > 1$$

# Nuclear Transmutations III:

With  $u$  as the amplitude of the surface plasma mode displacement, the glow discharge is past the threshold for neutron production.

$$e^{-} + p^{+} \rightarrow n + \nu_e \quad (\beta mc^2 + M^{+}c^2) > Mc^2$$

$$\beta = \sqrt{1 + \frac{\overline{E^2}}{E_0^2}} = \sqrt{1 + \frac{4e^2 \langle |\mathbf{u}|^2 \rangle}{3mc\Omega a^3}} \quad a = \frac{\hbar^2}{me^2}$$

$$\sqrt{\overline{E^2}} \sim 5E_0 \quad E_0 \sim 10^7 \text{ Gauss}$$

$$1 \text{ Gauss} \approx 300 \text{ volt/cm}$$

# Nuclear Transmutations IV:

$$\beta > \beta_{\text{threshold}} \approx \frac{M_n - M_p}{m} \approx 2.531$$

$$\Gamma_2 \approx \left( \frac{3g_V^2 + g_A^2}{2\pi^2} \right) \left( \frac{G_F m^2}{\hbar c} \right)^2 \left( \frac{mc^2}{\hbar} \right) n_2 (\beta - \beta_{\text{threshold}})^2$$

$$\Gamma_2 \approx \varpi (\beta - \beta_{\text{threshold}})^2$$

$$10^{12} \frac{\text{Hz}}{\text{cm}^2} < \varpi < 10^{14} \frac{\text{Hz}}{\text{cm}^2}$$

# Nuclear Transmutations V:

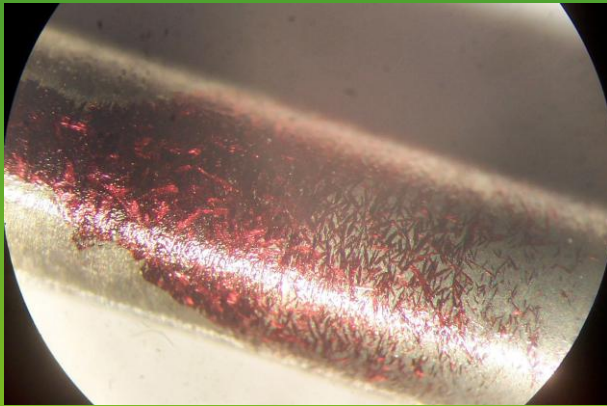
Nuclear Sequences are of the form shown below.



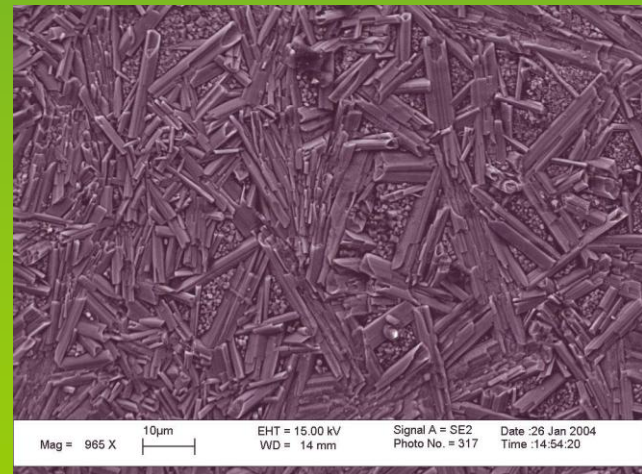


# Nuclear Transmutations VI:

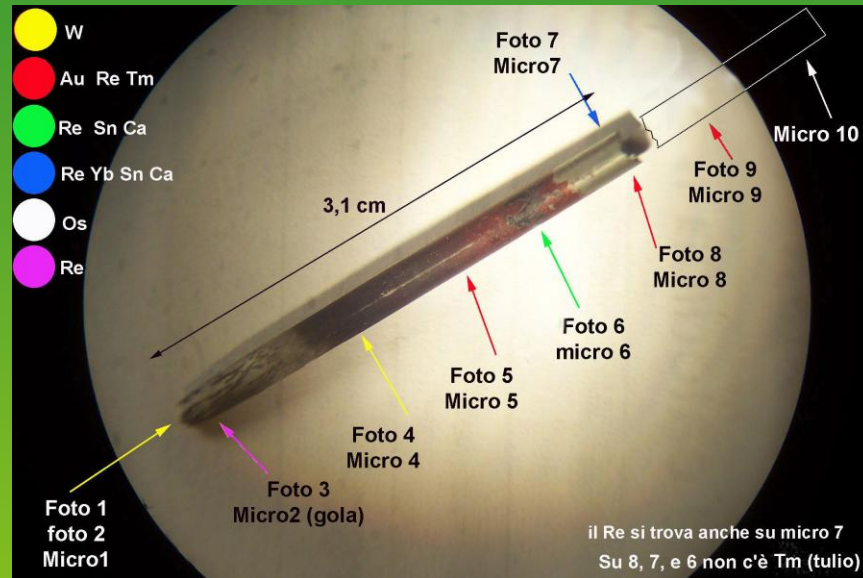
Transmuted Deposit on  
the Cathode after Prolonged  
Discharge glow



Grain Size ~ 10microns



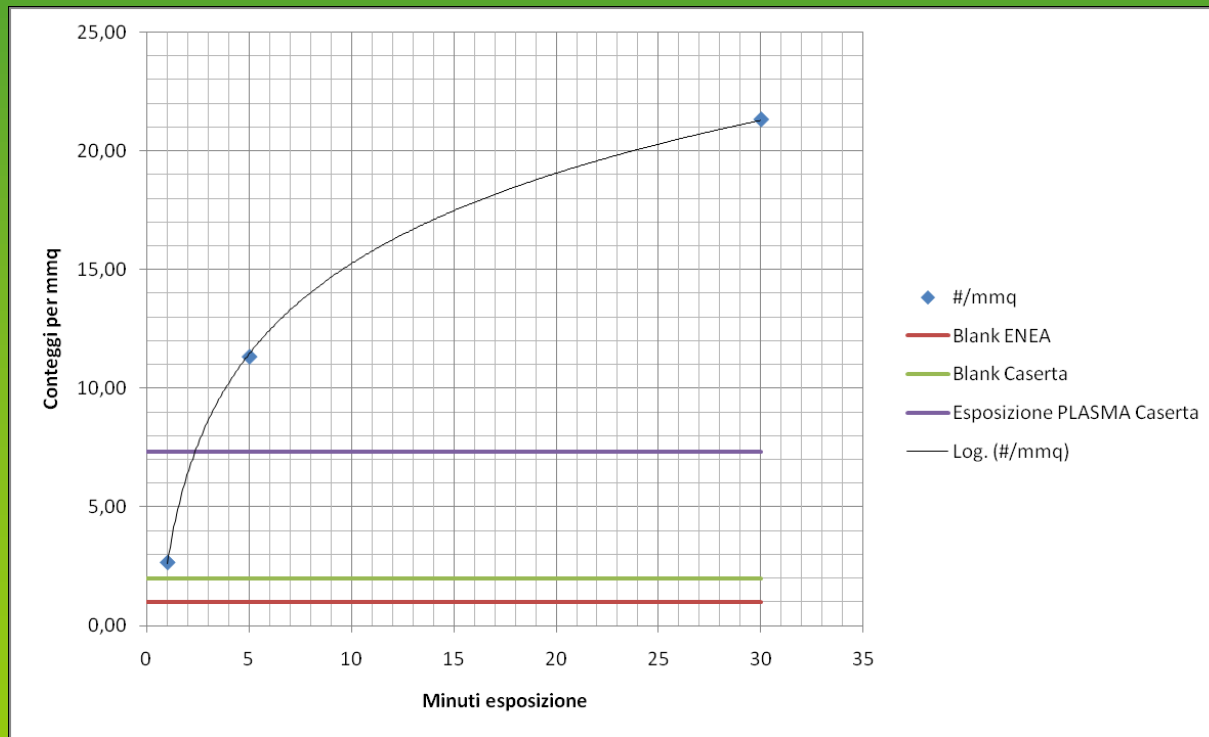
# Nuclear Transmutations VII:



64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81
Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl
157.25	158.93	162.50	164.93	167.26	168.93	173.04	174.97	178.49	180.95	183.84	186.21	190.2	192.2	195.08	196.97	200.59	204.3

# Nuclear Transmutations VIII:

Neutrons Have Now Been Directly Observed



# Conclusions:

- **Two Kinds of Water in Chemical Cells**
- **Electrolysis is slowed down during glow discharge.**
- **Glow discharges excite cathode surface plasma modes**
- **Neutrons and Nuclear Transmutations are observed.**
- **Agreement between theory and experiment.**
- **The detailed analysis regarding these chemical cells as a nuclear power source is under investigation.**