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Research Article

Experimental Results of Lattice Energy Converter LEC

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Abstract

The lattice energy converter (LEC) phenomenon was discovered by American scientists Frank Gordon and Harper J. Whitehouse. LEC can be generally described as the following: a pair of electrode plates with one treated with co-deposition on surface are placed close to each other. The spacing between the two plates is between 0.5 – 1 mm, with hydrogen, deuterium or air filling up the space between them. As a result, a voltage of several hundred millivolts can be measured [Ref. 1]. Alan Smith, a British scientist activated the surface by the electrolytic method and successfully reproduced the LEC experiment [Ref. 4]. We have recently be doing LEC experiments intensively. Some preliminary experimental results were obtained, and LEC phenomenon was observed. For clarity, let me introduce the process of our experiments. This was a preliminary experiment. Iron plating, nickel plating, copper plating and electrolytic treatment were used to activate the metal surface and observe whether LEC voltage was generated. The experimental setting was a little bit rough, and hydrogen leakage from the valve might occasionally occurred.

Keywords: LEC, co-deposition, voltage, hydrogen, air

1. Experimental Device

1.1. Reactor

The reactor is composed of two titanium tubes, both of which are 500 mm in length. The outer tube diameter and wall thickness was 16 mm and 1.0 mm respectively, and the inner tube diameter was 12 mm, which was basically the same as the device structure proposed by Antonio Di Stefano in Italy [Ref. 3].

Because the thermal conductivity of titanium is low, titanium was chosen as the material for the reactor, so that the temperature of the plastic joint, which was not resistant to high temperature, remained low when the titanium tube was heated.

1.2. Titanium Tube Activation Surface

The following methods were applied to activate the surface: 1. Electroplating with iron; 2. Electroplating with nickel; 3. Electroplating with copper; 4. Electrolysis.

Figure 1. Titanium tube reactor.

Figure 2. Titanium tube reactor with the heater and thermocouple.

Figure 3. Titanium tube after nickel plating; titanium tube after copper plating; titanium tube after iron plating.

1.2.1. *Electroplating with Iron on Titanium Tube*

A layer of iron with a thickness of about 100 microns was deposited on the inner titanium tube by the electroplating method. The electrolyte was prepared with 300g of ferrous chloride and one liter of water. The electroplating current was 50–290 mA, the voltage was 0.6 V, and the duration of the treatment was 48 hours. The titanium tube was taken as the cathode and the iron the anode. The iron anode was wrapped in a layer of ordinary glass fiber cloth to isolate the cathode from the anode. The glass fiber cloth remained uncoated.

1.2.2. *Electroplating Nickel on Titanium Tube*

The experimental setting for nickel plating was the same as that for iron plating. The current was 100 - 300 mA, theapplied voltage was 0.6 V, the duration of the plating treatment was 3 hours, and the thickness of the coating was about 10 microns. The electrolyte was the prepared nickel plating solution. The titanium tube was taken as the cathode and the nickel the anode.

1.2.3. *Electroplating Copper on Titanium Tube*

The copper plating device was the same as the iron plating device, with a current of 100 - 300 mA, a voltage of 0.6 V, 3 hours duration for the treatment, and a coating thickness of about 10 μm. The electrolyte was a prepared copper plating solution purchased from Taobao.com. The titanium tube was the cathode and the copper is the anode.

Figure 4. Titanium tube after electrolysis.

1.2.4. *Titanium Tube Electrolysis*

The electrolysis device was the same as iron plating, with a current of 300 mA, a voltage of 60 V and an electrolysis duration of 3 hours. The electrolyte was tap water. Both of the anode and cathode (the tube) were made of titanium.

The electrolytic method was basically the same as Alan Smith's method [Ref. 4]. Due to the limitation of conditions, tap water was used for electrolysis instead of potassium carbonate. The conductivity of tap water was not stable, and the voltage fluctuated during electrolysis.

2. Experimental Process

During the experiment, air, hydrogen or deuterium were introduced into the reactor, and the reactor was heated to observe the change of LEC voltage. It is worth noting that the vacuum pump cannot be used to replace the gas, because it would damage the activated surface, resulting in the LEC voltage being zero. Hydrogen or deuterium could be introduced at one end of the tube, and the air was flushed out from the other end.

3. Experimental Results

3.1. Electroplating Iron on Titanium Tube

3.1.1. *Temperature and LEC Voltage of Electroplated Iron on Titanium Tube in Air*

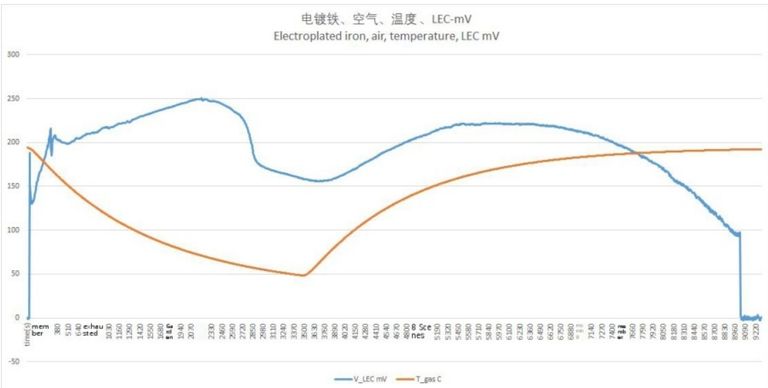

Figure 5. Data diagram of electroplated iron-titanium pipe in air.

3.1.2. *Temperature, Air Pressure and LEC Voltage of Electroplated Iron on Titanium Tube in Hydrogen*

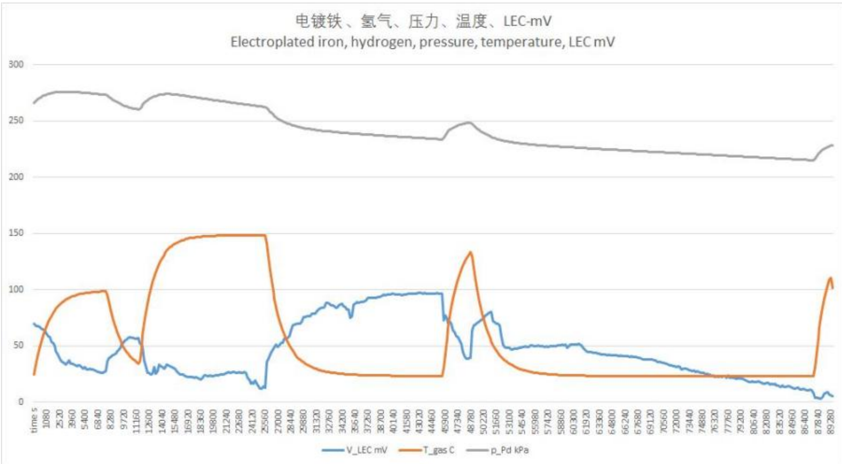

Figure 6. Data diagram of electroplated Fe-Ti pipe in hydrogen.

3.1.3. *Temperature, Air Pressure and LEC Voltage of Electroplated Iron on Titanium Tube in Deuterium Gas*

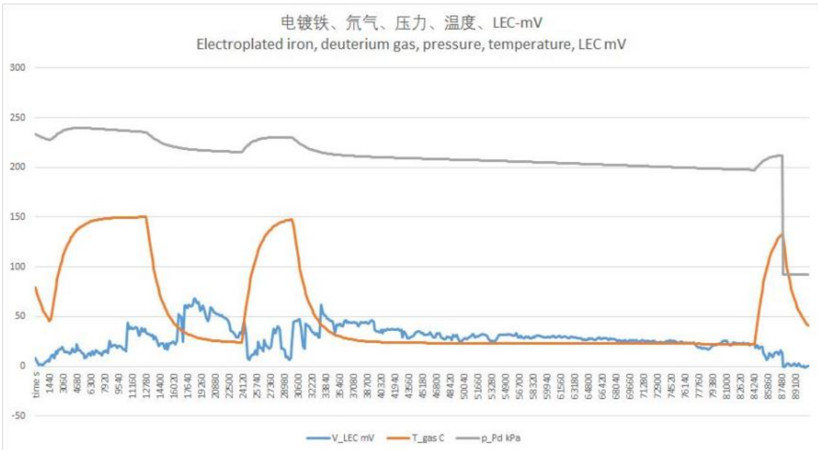

Figure 7. Data diagram of electroplated Fe-Ti tube in deuterium gas.

3.2. Nickel Plating on Titanium Tube

3.2.1. *Temperature, Air Pressure and LEC Voltage of Electroplating Nickel on Titanium Tube in Hydrogen*

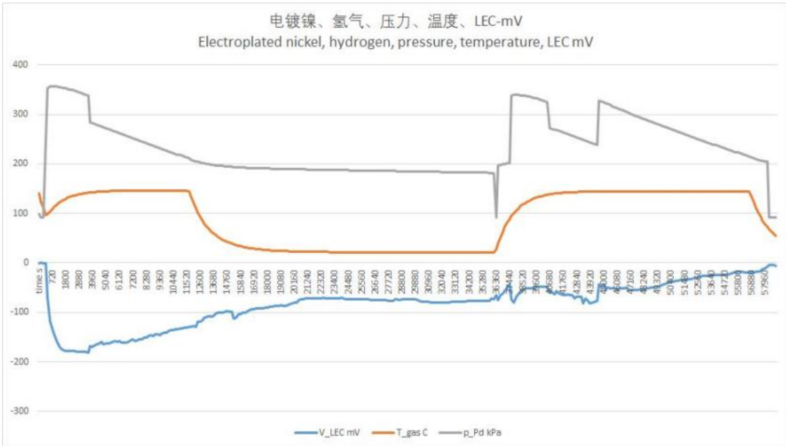

Figure 8. Data diagram of electroplated nickel-titanium tube in hydrogen gas.

3.3. Electroplating Copper on Titanium Tube

3.3.1. *Temperature and LEC Voltage of Electroplating Copper on Titanium Tube in Air*

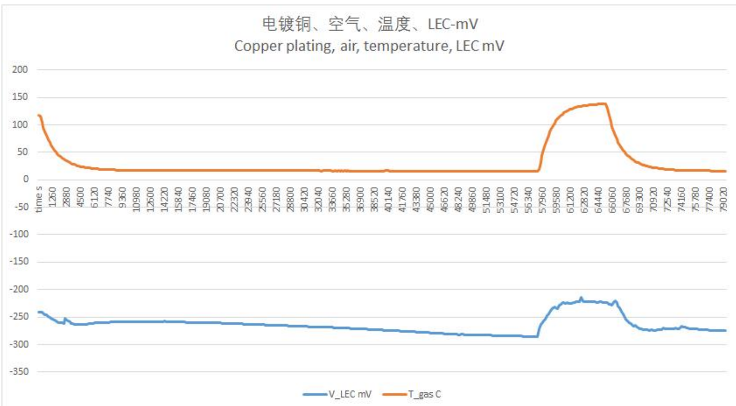

Figure 9. Data diagram of electroplated copper-titanium pipe in air.

3.3.2. *Temperature, Air Pressure and LEC Voltage of Copper Plating on Titanium Tube in Hydrogen*

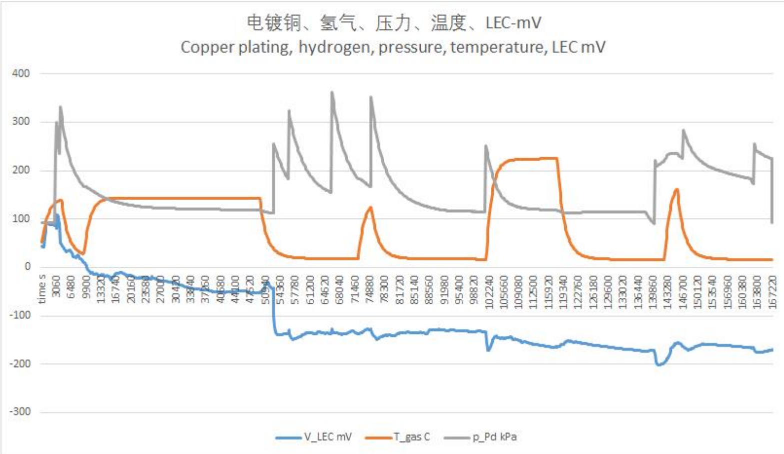

Figure 10. Data diagram of electroplated copper titanium tube in hydrogen.

3.4. Titanium Tube Electrolysis

3.4.1. *Temperature and LEC Voltage of Titanium Tube in Air After Electrolysis*

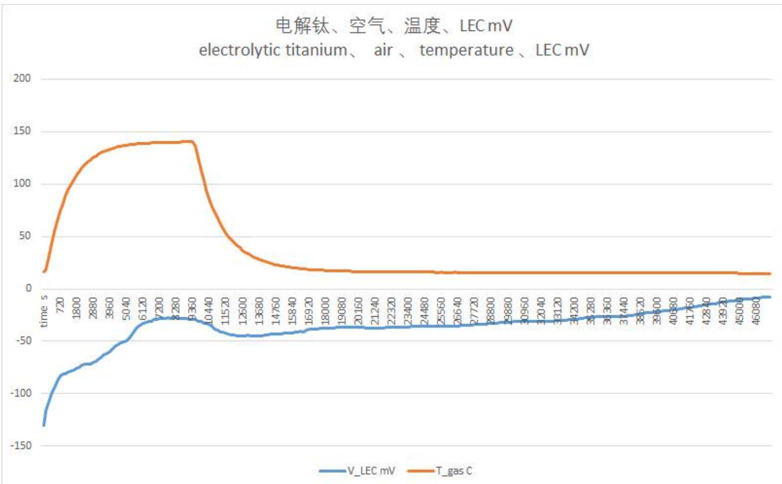

Figure 11. Data diagram of electrolytic titanium tube in air.

3.4.2. *Temperature, Air Pressure and LEC Voltage in Hydrogen After Titanium Tube Electrolysis*

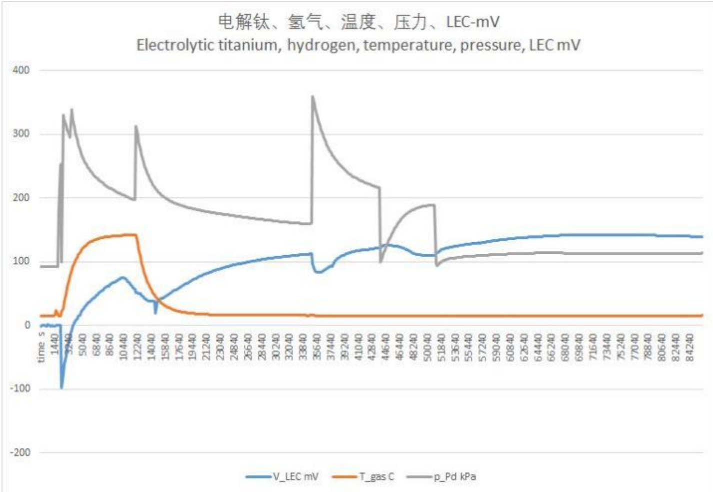

Figure 12. Data diagram of electrolytic titanium tube in hydrogen.

4. Summary

4.1 there are many methods to activate the metal surface. In this experiment, we tried the method of electroplating iron, nickel, copper or to conduct activation with electrolysis, before measuring for LEC voltage.

4.2 LEC voltage was measured in hydrogen, deuterium and air.

4.3 The LEC voltage was unstable.

4.4 The inner and outer pipes of the reactor were well insulated, and on Fermi level, contact electromotive force and thermocouple phenomena were excluded.

4.5 The experiment was highly reproducible.

4.6 No data higher than background radiation was detected by Geiger counter.

5. Discussion of the LEC Effect

5.1 The LEC experiment has good reproducibility and can be used as a reference for scientific research.

5.2 The generation mechanism of LEC voltage is still unclear, and it can't be explained by known theories at present.

5.3 Follow-up research is highly recommended, such as X-ray detection, metal surface morphology detection, metal elements detection, isotope detection, gamma ray detection, other ray detection, etc., to determine the mechanism.

Acknowledgement

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