Collected results of first tests of lattice energy converter (LEC)

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ABSTRACT.

The LEC, a simple device producing electrical energy, was discovered by American scientists Frank Gordon and Harper J Whitehouse. They have described it as a ‘contact potential difference device’. The two electrode plates that form the cell are not in physical contact, being separated by any one of a number of gases. Various experiments and their results are described, typically ones where the surface of a ‘working electrode’ is co-deposited with hydrogen and another metal, for example Fe or Pd. Voltage is measured between a carefully washed and dried working electrode and a plain metal counter electrode, the distance between them is 0.5-1mm. The interstitial gas may be hydrogen, deuterium, air or other gases, and a voltage of several hundred millivolts can be measured [Ref. 1]. Alan Smith, a British scientist, created working electrodes by simple electrolysis of metal plates in light water without co-deposition and reproduced the LEC effect with different metals. [Ref. 4]. Recently Qiuran Laboratory has devoted considerable time to studying the LEC effect and we present some preliminary experimental results in which LEC phenomena have been observed. These experiments are qualitative ones in which iron plating, nickel plating, copper plating and electrolysis are used to activate working electrode surfaces and electrical measurements made to determine if LEC voltage is generated. Since the results reported here are ‘early stage’ we confess the methods are not yet refined, and we suffered some problems, including hydrogen valve leaks.

1.0 EQUIPMENT AND MATERIALS - THE REACTOR.

The reactor is composed of two titanium tubes, both of which are 500mm in length, the outer tube diameter * wall thickness is 16*1.0mm, and the inner tube diameter * wall thickness is 12*1.0, which is similar to the LEC devised by Antonio Di Stefano.[Ref. 3].

Figure 1. Titanium tube reactor.

We chose titanium for our first experiments because the thermal conductivity of titanium is low, and the connecting seals between tubes are plastic, so not resistant to high temperatures. This means that when the center of the reactor is heated the temperature of the ends where the seals are remains low.

Figure 2. Titanium tube reactor with heater and thermocouple.

1.1 Ti WORKING ELECTRODE ACTIVATION METHODS

The following methods were used to activate the surface: 1. Electroplating iron, 2. Electroplating nickel, 3. Electroplating copper, 4. Electrolysis without plating..

1.2.1 ELECTROPLATING IRON ON TITANIUM TUBE

A layer of iron with a thickness of about 100 microns was deposited on the inner titanium tube by 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 electroplating time was 48 hours. The titanium tube was the cathode and the iron was the anode. The iron anode was wrapped in uncoated glass fiber cloth to isolate the cathode electrically from the anode.

Fig. 3 Iron electroplating setup.

Fig. 4 Titanium tube after electroplating iron.

1.2.2 Electroplating nickel on titanium tube.

The device for nickel plating is the same as that for iron plating. The current is 100-300 mA, the voltage is 0.6 V, the plating time is 3 hours, and the thickness of the coating is about 10 microns. The electrolyte is the finished nickel plating solution purchased from Taobao. The titanium tube is the cathode and the nickel is the anode.

Fig. 5 Titanium tube after nickel plating.

1.2.3 ELECTROPLATING COPPER ON TITANIUM TUBE

The copper plating device is the same as the iron plating device, with a current of 100-300mA, a voltage of 0.6V, a plating time of 3 hours, and a coating thickness of about 10μ m. The electrolyte is the finished copper plating solution purchased from Taobao. The titanium tube is the cathode and the copper is the anode.

Fig. 6 Titanium tube after copper plating

1.2.4 TITANIUM TUBE ELECTROLYSIS

The electrolysis device is the same as iron plating, with a current of 300 mA, a voltage of 60 V and an electrolysis time of 3 hours. The electrolyte is tap water, a titanium tube is the cathode and titanium is the anode.

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

Fig. 7 Titanium tube after electrolysis

After the reactor was assembled, the electrical isolation of the inner and outer tubes was checked. Because the distance between the inner and outer walls is small, the inner and outer walls of the two tubes could make contact, resulting in a short circuit. The insulation should be checked before the experiment.

Fig. 8 The inner and outer tubes are checked for electrical isolation..

1.2 Detection circuit

The detection circuit is basically the same as that of Dr. Antonio Di Stefano's voltage detection circuit. KEITHLEY 2700 data acquisition multimeter is used for the detection instrument. In this experiment, only the voltage is measured, and the parallel resistance is 1MΩ, which is very important. Without this resistance, the detection instrument won’t work normally.

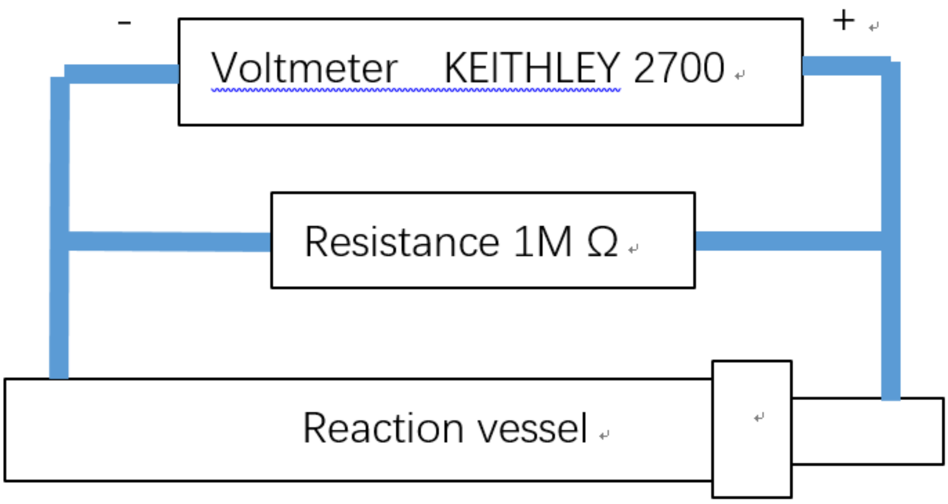

Figure 9 LEC voltage detection circuit diagram

2. EXPERIMENTS WITH GASES

During the experiment, air, hydrogen and deuterium gases were introduced into the reactor, following which the reactor was heated to observe any changes in LEC voltage. It is important to note that the vacuum pump should not be used to assist with changing the gas, since it may damage the activated surface, resulting in the LEC voltage being zero. Only hydrogen or deuterium were blown gently into the tube assembly, so that they displaced the air from the system via the other end of the LEC.

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

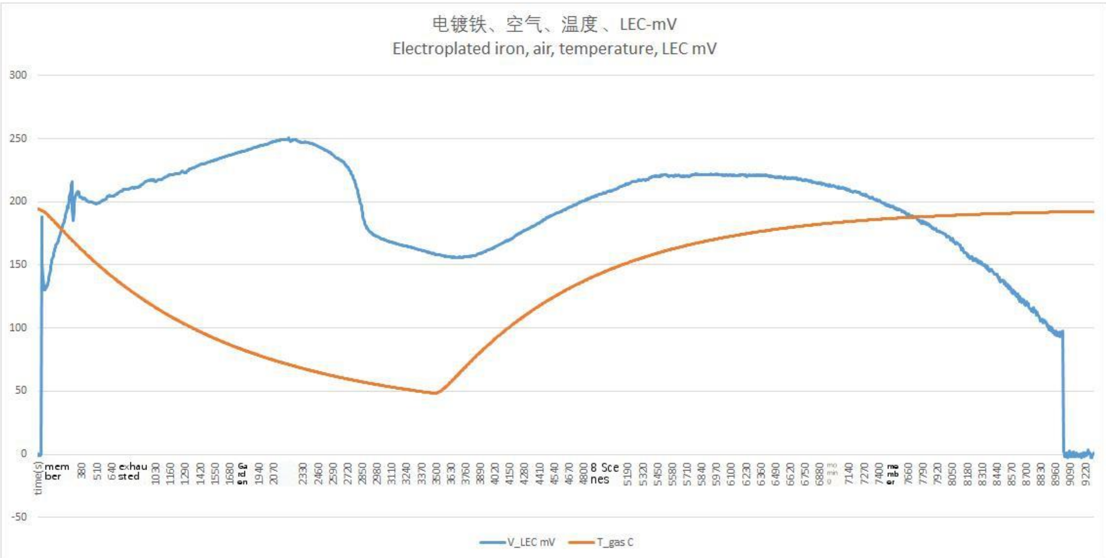

Fig. 10. Data diagram of electroplated iron-titanium pipe in air

3.1.2 Temperature, air pressure and LEC voltage of electroplated iron on titanium tube in hydrogen

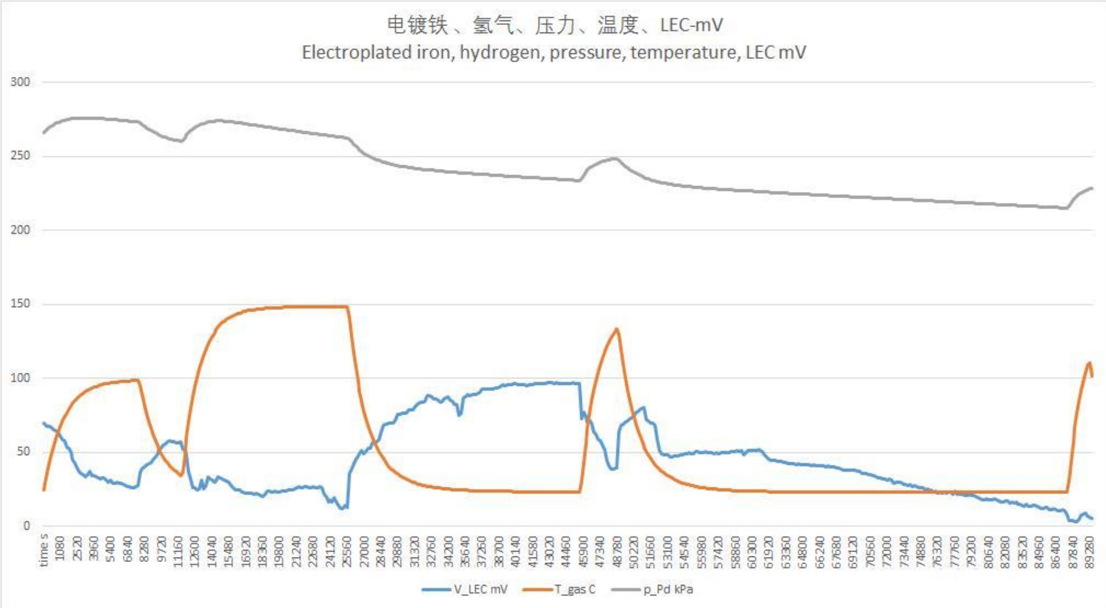

Fig. 11. Data diagram of electroplated Fe-Ti pipe in hydrogen

3.1.3 Temperature, air pressure and LEC voltage of electroplated iron on titanium tube in deuterium gas

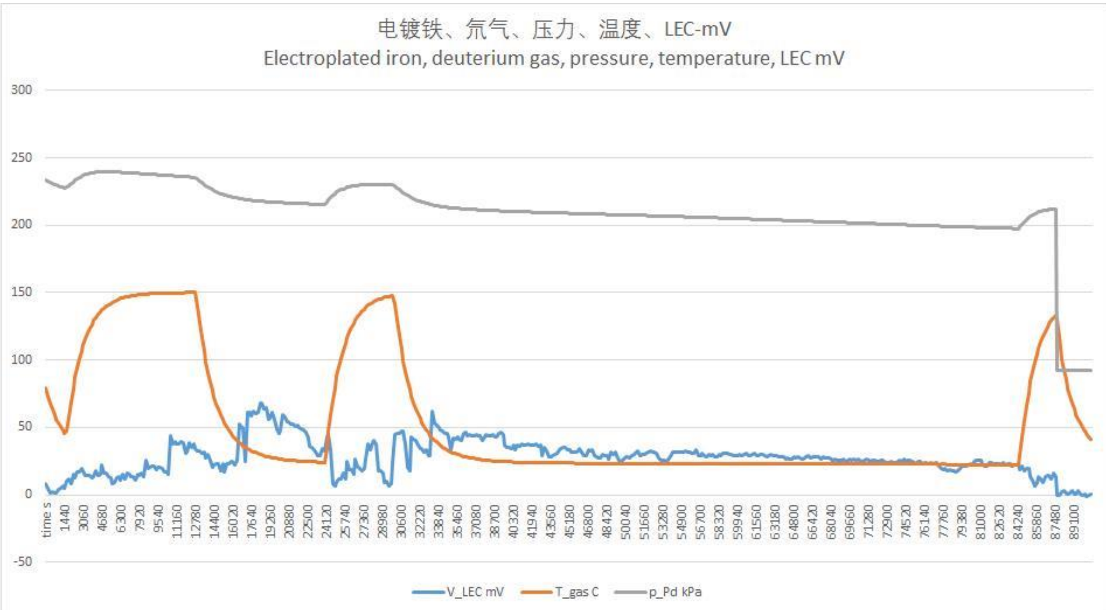

Fig. 12. Data diagram of electroplated Fe-Ti tube in deuterium gas

3.2 Nickel plating on titanium tube

3.2.1 Temperature, air pressure and LEC voltage of electroplating nickel on titanium tube in hydrogen

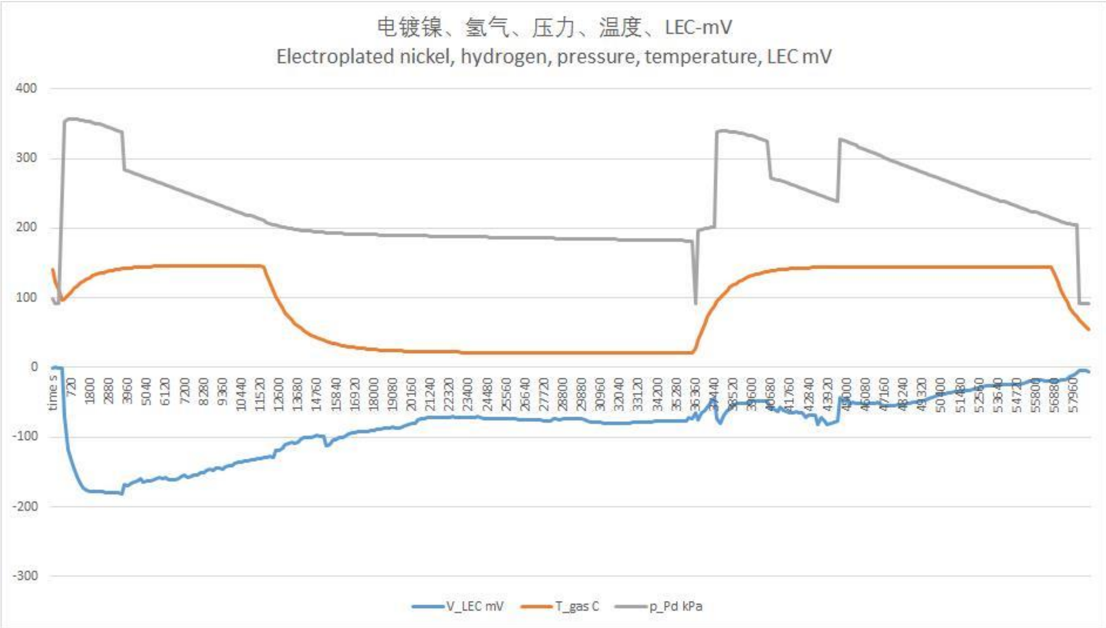

Fig. 13. Data diagram of electroplated nickel-titanium tube in hydrogen gas

3.3 Electroplating copper on titanium tube

3.3.1 Temperature and LEC voltage of electroplating copper on titanium tube in air

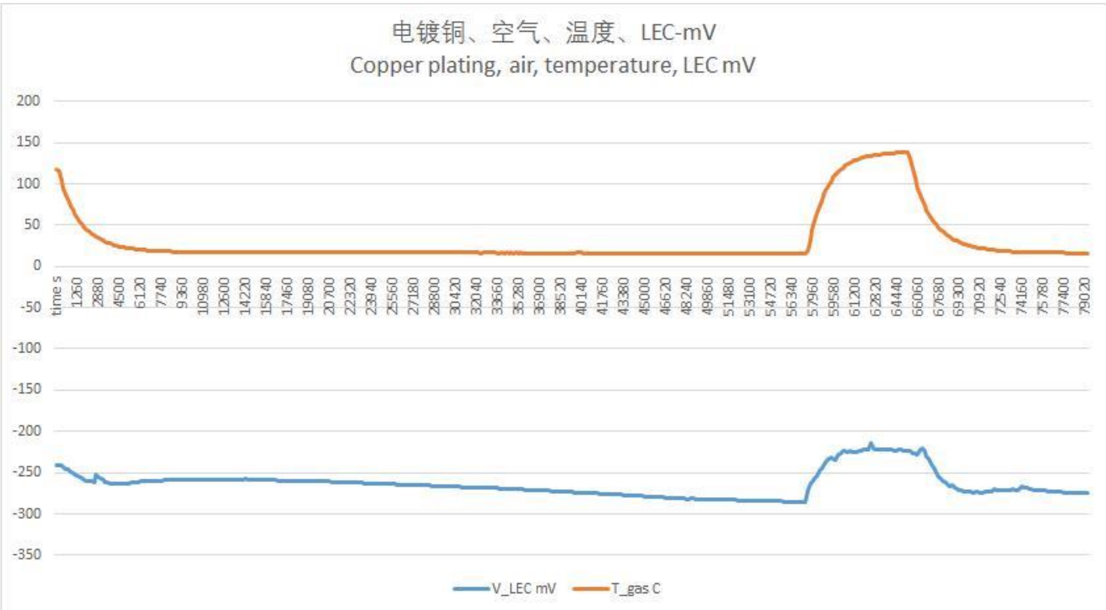

Fig. 14. Data diagram of electroplated copper-titanium pipe in air

3.3.2 temperature, air pressure and LEC voltage of copper plating on titanium tube in hydrogen

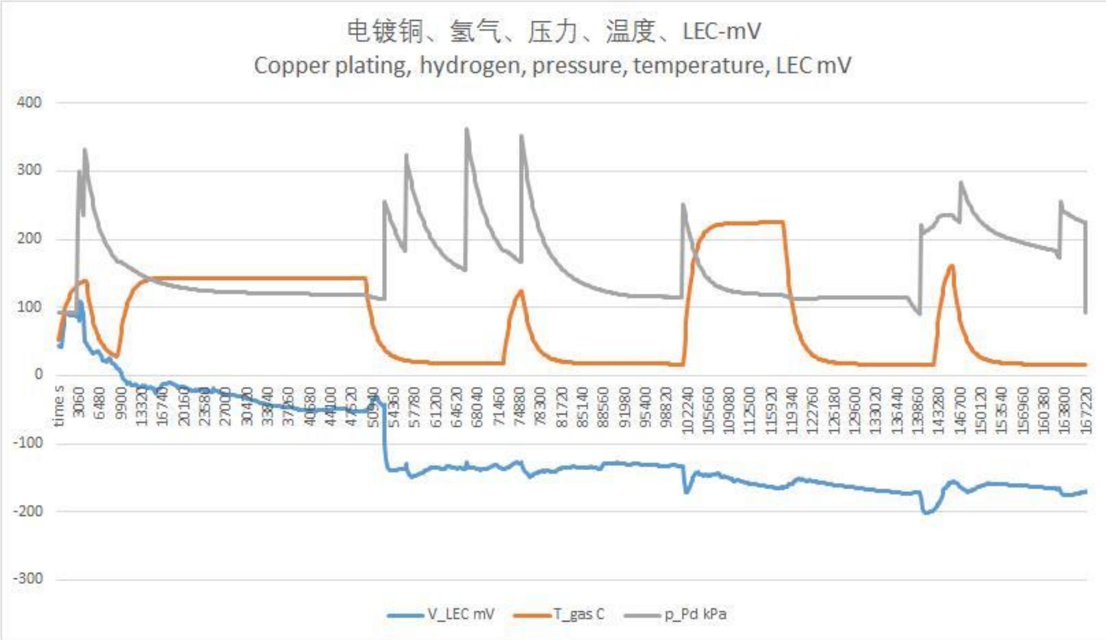

Figure 15. Data diagram of electroplated copper titanium tube in hydrogen

3.4.1 temperature and LEC voltage of titanium tube in air after electrolysis

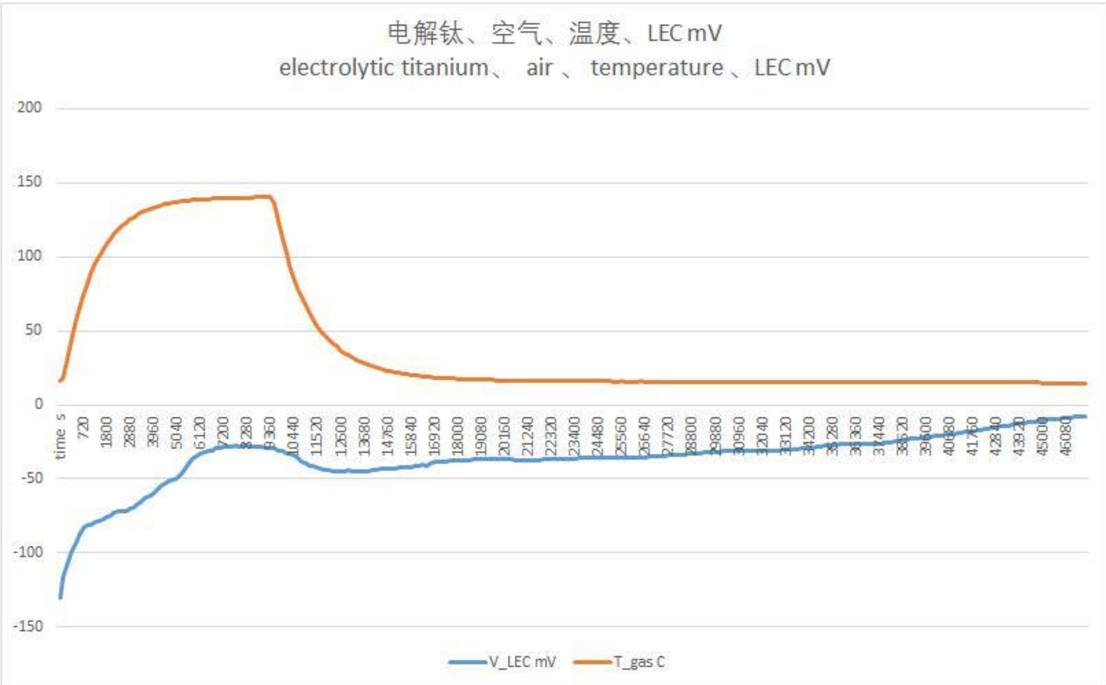

Figure 16. Data diagram of electrolytic titanium tube in air

3.4.2 temperature, air pressure and LEC voltage in hydrogen after titanium tube electrolysis

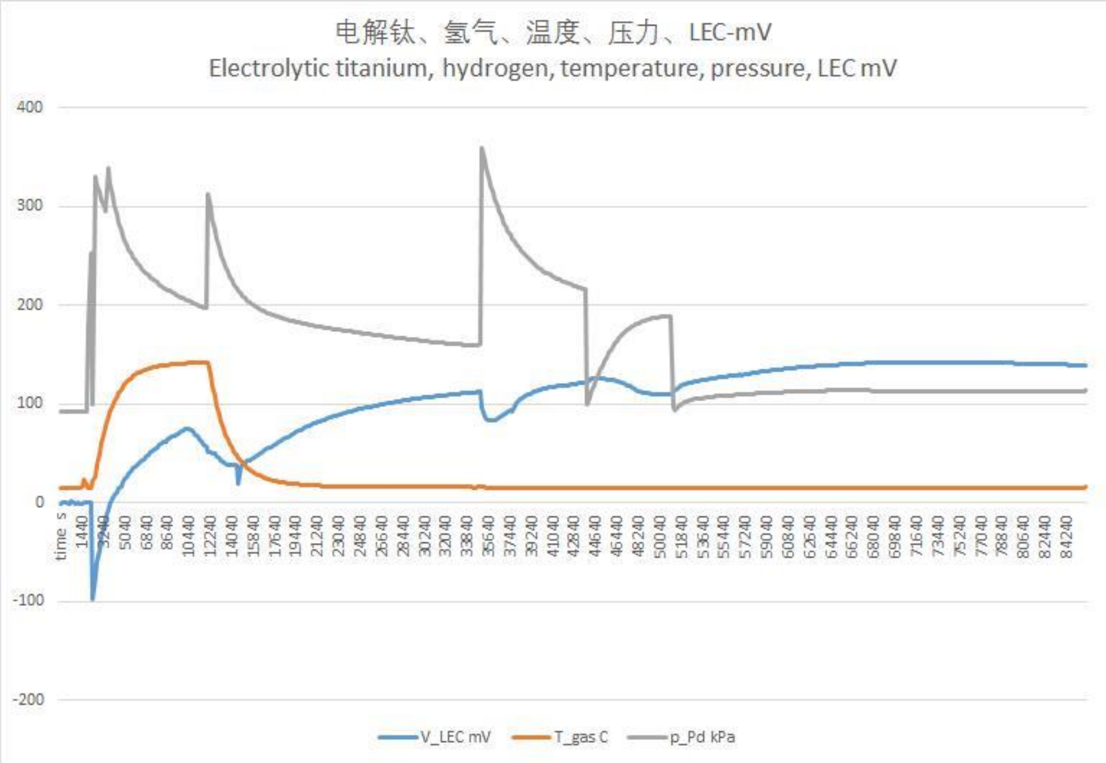

Figure 17. Data diagram of electrolytic titanium tube in hydrogen

4. SUMMARY

4.1 there are many methods to activate the metal surface. In this experiment, we tried to electroplate iron, nickel, copper and electrolysis, and measured LEC voltage.

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

4.3 the LEC voltage is unstable.

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

4.5 The experimental repeatability is good.

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

5. THOUGHTS ON THE LEC.

5.1 LEC experiment has good reproducibility and can be used as a scientific basis.

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 needs to do a lot of work, such as X-ray detection, metal surface morphology detection, metal elements detection, isotope detection, gamma ray detection, other rays detection, etc., to find out the mechanism.

THANKS

Professor Li Xingzhong, Dr. Zhang Wushou, Frank E Gordon, Alan Smith, Antonio Di Stefano and Dr. Jean-Paul Biberian provided help and guidance to the experimental work.

REFERENCES

1. Lattice Energy Converter (LEC)   Frank E Gordon Harper J Whitehouse ICCF 24, 25-28 July 2022

2. Lattice Energy Conversion Replication   Jean-Paul Biberian , Jean-Philippe Ginestet

3. Experimental Observations on the Lattice Energy Converter Dr. Antonio Di Stefano, .Prysmian Electronics s.r.l. ICCF24   July 27 - 2022

4. THE LEC DEVICE – EXPLORING THE PARAMETER SPACE   Alan Smith Net Zero Scientific Ltd, Essex, UK. September 2022. netzeroscientific@gmail.com. www.netzerochem.com