

**Electrochemical precipitation of titanium from molten salts using alternating current.****F.A. Voroshilov**

Tomsk Polytechnic University, Lenin Avenue, 30, Tomsk, Russia, 634050

On receiving metallic titanium with electrochemical reduction from molten salts using alternating current it is not possible to cause metal precipitate into cathode precipitate at more than 30% [1]. The residual mass is with electrolyte. Mechanism of forming metallic titanium consists of two stages: the first stage is reduction of ions of potassium with cathode, the second – chemical reaction with formed atoms of potassium. Therefore diffusive processes signify in formation of titanium cover. Literary survey showed that utilization of impulse current can cause increase of metallic titanium share in precipitate [2]. Energy of impulse should be enough for formation of some quantity of potassium with cathode. This quantity of potassium should transform into form of ions within a pause again. Experimenting with ratio between the width of impulse and pause, and also amplitude of impulse, it is possible to increase the output in current up to 70-80%.

For making experiments experimental plant was supplemented with impulse power source which formed impulses of rectangular forms [3]. The width of impulse and pause could be given in large bounds. Double-beam memorizing oscillograph was used for recording the form of potential and current, flowing through the cell. The whole range of experiments where the width of impulse was changed within the interval 5 – 25 ms, and the pause 5 – 100 ms, was completed. It was stated that cathode precipitate with the amplitude 3,0 V and the width of impulse less than 5 ms is not formed due to low rate of formation of potassium with cathode. The increase of width of impulse till 25 ms, and porosity till 4 causes formation of thick cathode precipitate which consists of small crystals. The best result we got at present is more than 70% of titanium in cathode precipitate. It proves that impulse electrolysis is more effective process than electrolysis with direct current. With small charge of energy the output in current is increased and cathode precipitate contains less quantity of electrolyte. The purpose of further research is choice of characteristic allowing getting maximum output of titanium.

## References:

- [1] Voroshilov F.A., Dyachenko A.N. Issledovanie protsessa elektroliza  $(\text{NH}_4)_3\text{TiF}_6$  v rasplave LiF-NaF-KF // *Sovremennyye problemy nauki i obrazovaniya*. 2011. Vyip. 11.
- [2] Nikiforova E.Yu., Kilimnik A.B. Zakonomernosti elektrohimicheskogo povedeniya metallov pri nalozhenii peremennogo toka // *Vestnik TGTU*. 2009. T. 15. Vyip. 3.
- [3] Kostin N.A. *Impulsnyiy elektroliz*. Kiev: Naukova Dumka, 1989. 169s.