

NANOCRYSTALLINE TITANIUM MONOOXIDE as LOW-TEMPERATURE SOLID ELECTROLYTE

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The last-years research of the structure and properties of nano-materials has pointed on the capabilities of use of nano-state substances in the field of Electrochemistry. The problem of reduction of operating temperature SOFCs is one of the main problems. Thus there is a need of the search of solid electrolytes having fair ionic conductivity [1]. The reduction of grain sizes of solid electrolyte is one of the ways of the solution of the problem. So the reduction of grain sizes to magnitudes less than 100 nm leads to both the increases of ionic conductivity and the stabilization of high-temperature crystal structure [2]. Thermodynamic stable crystal structure is very important to get enduring solid electrolyte. A.V. Ustyugov et al. [3] used nanocrystalline Y-stabilized zirconia (YSZ) as SOFC solid electrolyte. Researche shown that electrochemical properties of nanocrystalline electrolyte are better than one of ordinary YSZ. It is suggested in this work to use nanocrystalline titanium monooxide as low-temperature electrolyte. Titanium monooxide has the structure and the properties similar to YSZ, but it has lower temperature of the synthesis. In addition it is cost effective material. Thus the suggested material is very promising for use in SOFC technology.

REFERENCES

1. K. Krist, J.D. Wright, Fuel Cell Seminar 1994, Program and Abstracts. November 28-December 1, San Diego, California. P. 45-48.
2. N.F. Uvarov, V.V. Boldyrev, Uspehi Himii. 2001, V.70, N 4, P. 307- 329. (in Russian)
3. A.V. Ustyugov et al., Russian Conference: Solid State Chemistry and functionality materials . Abstracts. Ekaterinburg 2000. P. 379. (in Russian)