

To study the physical and thermophysical properties of Li_2TiO_3 synthesized by
solid-state reaction method

Abstract

Institute for Plasma Research is working towards development of functional and structural materials for the fusion-based reactor. Li_2TiO_3 is considered a tritium breeding material for Indian fusion blanket and is presently under development. As a part of the development, it is important to study and estimate various properties like physical, mechanical, thermophysical, thermomechanical, chemical, and structural.

In the project work, it is proposed to study some of the properties of Li_2TiO_3 like true density, bulk density, porosity, and crush strength of the Li_2TiO_3 . Also, thermophysical properties such as melting point, enthalpy, specific heat, temperature-dependent density, and thermal expansion and shrinkage will also be measured. A range of characterization methods is planned to be used for the above study. As part of the project work, the student will get hands-on experience on the use of thermogravimetric analyzer, high-temperature dilatometer, helium pycnometer, and mercury porosimeter.

Relevant references [Publications, web links etc.]:

- [1] A. Shrivastava, M. Makwana, P. Chaudhuri, E. Rajendrakumar, Preparation and characterization of the lithium metatitanate ceramics by solution-combustion method for Indian LLCB TBM, Fusion Sci. Technol. **65** (2014) 319–324. <https://doi.org/10.13182/FST13-658>.
- [2] A. Shrivastava, T. Kumar, R. Shukla, P. Chaudhuri, Li_2TiO_3 pebble fabrication by freeze granulation & freeze-drying method, Fusion Eng. Des. **168** (2021) 112411. <https://doi.org/10.1016/j.fusengdes.2021.112411>.
- [3] A. Shrivastava, R. Shukla, P. Chaudhuri, Effect of porosity on thermal conductivity of Li_2TiO_3 ceramic compact, Fusion Eng. Des. **166** (2021) 112318. <https://doi.org/10.1016/j.fusengdes.2021.112318>.

Student Eligibility Requirements for the Project:

- 1) Required No. of student(s) : 01
- 2) Name of course with branch/discipline : Metallurgy/Materials Sci/Material Technol.
- 3) Academic Project duration : 9 months
- 4) Student's presence at IPR for the project work : at least 3 full working days/week

Eligible candidates may send in their application to:

aroh@ipr.res.in (Project Guide's e-mail address) **AND**
project_ms@ipr.res.in (Project coordinator's e-mail address)

For clarifications, if any, contact:

Phone Number: 079-23962338 (Guide phone number)

Format for submission of application is given under “Application for Academic project work at IPR” (Annexure – II: Recommendation letter and Annexure – III: Certificate of undertaking)