Contribution ID: **1236** Type: **not specified**

P3.189 High temperature hydrogen selective solid-state electrolyte sensor fabricated by slip casting

Wednesday, 19 September 2018 11:00 (2 hours)

Tritium management is one of the main challenges that future nuclear fusion energy has to achieve. Accurate tritium monitoring is a basic task in order to have relying fusion reactors. High temperature sensors have to be developed to make this monitoring a reality. Hydrogen sensors based on solid-state electrolytes can be a reliable option to perform this monitoring. These types of sensors offer resistance to harsh chemical environments, temperature depending conductivity and quick and easy to measure signals.
Potentiometric and amperometric hydrogen sensors based on solid-state electrolytes were previously studied at the Electrochemical Methods Laboratory at Institut Químic de Sarrià (IQS) at Barcelona. These previous sensors contained a pellet-shaped solid-state electrolyte. Performing a slip casting process to the electrolyte can increase the sensor signal due to a surface increase. The satisfactory results obtained with shaped amperometric sensors by slip casting present a promising path to the development of high temperature tritium sensors.
In the present work, a process to fabricate solid-state electrolytes by slip casting for amperometric hydrogen sensors has been developed. Amperometric electrochemical measurements have been performed at different hydrogen partial pressures (0.25 to 2.5 mbar), at 500 ºC and applying 5 V between the electrodes of the sensor to polarize it.

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Session Classification: P3