PERSONA CIÈNCIA EMPRESA
UNIVERSITAT RAMON LLULL

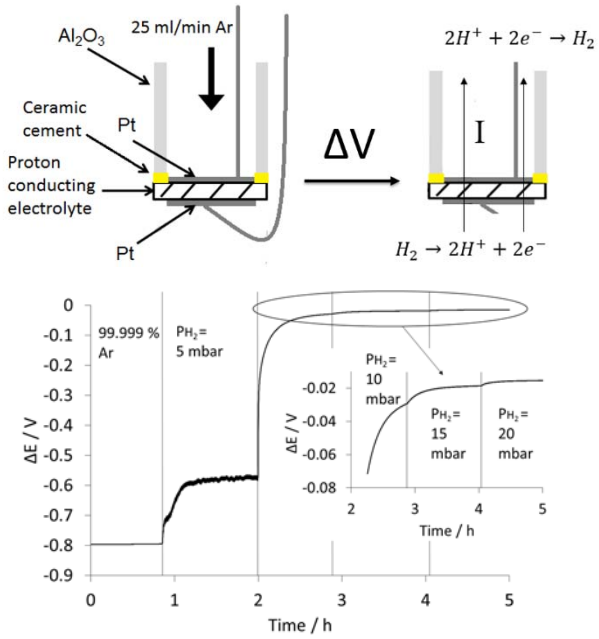
RESEARCH PROJECT

High temperature electrochemical gas sensors

In 1957, K. Kiukkola and C. Wagner discovered that doped zirconia or thoria can be used as solid electrolyte for galvanic cells operating at high temperatures. Electrochemical sensors based on solid electrolytes have been successfully used for gas sensors in many applications, e.g. steelmaking and automotive industry. This type of sensors has several advantages when used in extreme conditions: generally are stable compounds which can withstand harsh chemical environments, the ionic conductivity increases with the temperature and the output signal is easy to measure.

Based on the sensing principle/configuration solid state based electrochemical sensors can be classified into two categories: amperometric and potentiometric. The first such sensors followed from the use of solid electrolytes for thermodynamic measurements, and are based on galvanic cells. Another approach is to use the current passing through the electrolyte, rather than the voltage across the electrolyte, as the sensor signal.

Lithium-lead eutectic (17% Li – 83% Pb) is one of the candidates to be used for tritium generation and primary coolant in the blanket in future fusion reactors. Accurate and reliable tritium management is of basic importance for the correct operation conditions of the blanket tritium cycle. Solid electrolyte proton conductors have attracted significant interest in this field because of their chemical and physical durability. In this frame, our research team is developing and testing hydrogen gas sensors for its use in future fusion reactors. Our focus at the Electrochemical Methods Laboratory at IQS has been on the development of high-temperature gas sensors for molten metals.



We are looking for a student of Analytical Chemistry, Chemical Engineering, or Material Science Engineering, highly motivated, for laboratory work in the synthesis and characterization of solid state electrolytes, evaluation of the sensors performance and design of experimental setups.

Position offered (2017-2018): 1 Master research project (6-9 month)

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