Project Title:
Plasma-catalysis effects on LCF Perovskite Ion Transport Membrane processing of CH₄

Project Reference Code:
UA-Uddi

Hosting Institution:
University of Alabama-Tuscaloosa

Hosting Institution Location:
Tuscaloosa, AL

Project Description:
**Plasma-Catalysis:** study the Plasma-Catalysis (PC) effect of non-equilibrium low temperature plasma on $La_{0.9}Ca_{0.1}FeO_3$ (or LCF) perovskite Ion Transport Membranes (ITMs) to produce different chemicals (syngas- CO + H₂, H₂, CO, CO₂, C₂H₄, C₂H₆, C₂H₂) using CO₂, CH₄, air as feedstock, at 1 atm pressure, in the temperature range 400-900 °C, through experiments. The effect of plasma on the ITM oxygen diffusion and surface reactions is to be studied.

**Method:** Assemble a home built reactor to test disc shaped ITMs. RF discharge will be applied over the ITM surface. The ITMs will be prepared in our lab by hydraulic pressing of LCF nano powders in an HSS mold. Tape casting will also be attempted. The ITMs will be assembled into the reactor, CH₄+CO₂ will be flown on one side of the membrane and air on the other side. Oxygen diffuses through the membrane and reacts with CH₄ on the other side, leading to CH₄ reforming or combustion. The exhaust gases will be analyzed for temporal species composition using a Quadrupole Mass Spectrometer (QMS).

Disciplines:
Chemistry, Math, Engineering

**U.S. citizenship required to participate in this project**

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The name and contact information of personnel at the hosting is provided for further assistance with questions regarding the hosting institution or the project.

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