



ARISTOTLE
UNIVERSITY
OF THESSALONIKI

Department of Chemical Engineering



Seminar

**Intensified sorption enhanced H₂ producing technologies:
Current status with emphasis on the applied CaO- and MgO-
based CO₂ sorbents**

Theodoros Papalas, *Ph.D. Candidate*

Laboratory of Petrochemical Technology, Aristotle University of Thessaloniki, University
Campus, Thessaloniki, Greece

Abstract

The Process intensification (PI) has been discerned by the European Federation of Chemical Engineering (EFCE) as an auspicious methodology for the development of sustainable process systems with reduced equipment size, energy requirements and environmental impact. PI involves the design of novel reactors that entangle a thermodynamically-limited chemical reaction with product separation, thereby securing improved conversion levels and main product purity without the need for downstream purification. These benefits can be thoroughly perceived by following current research efforts on the sorption enhanced steam methane reforming and water gas shift processes, which target on the generation of high-purity H₂ in a single step by separating the main by-product CO₂ via adsorption using proper solid materials, such as CaO and MgO. The evolution of these technologies can contribute to the satisfaction of the global H₂ demand, which has escalated dramatically due to the importance of H₂ as a raw material in oil refineries and the chemical sector, while it has also been heralded as the “fuel of the future” due to its energy-efficient and clean combustion. However, the successful upscaling of these processes entails their thorough study, with the development of proper solid sorbents deserving peculiar attention as a preliminary but fundamental research topic. This presentation aims to shed light on the sorption-enhanced H₂ production via various experimental or computational studies, with particular focus on the development of CaO- or MgO-based materials with adequate CO₂ capture capabilities.

Date: 31 March 2021, Online event via zoom

Time: 2 pm