Plasma-assisted Gas Production: Fundamentals and Applications

Speaker

Martin Gräbner

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Plasma-assisted gas production involves advanced thermal processes that enable efficient waste-to-energy conversion or gas upgrading by generating a high-quality syngas. This lecture explores the thermodynamic advantages of plasma integration, emphasizing its role in enhancing gasification efficiency and product gas composition. Beginning with the fundamentals of plasma generation, the influence of different feedstocks and plasma conditions on syngas quality will be analyzed. Key industrial applications are discussed and special attention will be given real implementations. Strategies developed at IEC for plasma-assisted syngas production will be introduced including a bench-scale fixed-bed plasma gasifier, MW plasma technology for gas upgrading, a batch plasma conversion unit as well as an arc-supported internal circulation gasifier. Critical aspects of process optimization will also be examined. The lecture concludes with a summary of current advancements and future perspectives in plasma-assisted gasification.

Prof. Dr.-Ing. Martin Gräbner is Director of Energy Process Engineering at the Institute for Energy Process Engineering and Chemical Engineering (IEC) and Professor for Energy Process Engineering at the TU Bergakademie Freiberg and since 2021 Head of Department (Freiberg) Energy and Process Engineering, Circular Carbon Technologies at the Fraunhofer IKTS Institute for Ceramic Technologies and Systems. Since 2023 he is deputy director of the Center for Efficient High Temperature Processes and Material Conversion in Freiberg. He researches, develops and optimizes new processes for energy and raw material conversion. The focus is on the creation of closed carbon cycles using renewable energies. This includes in particular the chemical recycling of residual materials (especially plastics), the production of synthetic raw materials and fuels (e.g. e-fuels) and the thermochemical production of hydrogen (e.g. from biogenic waste). The goal is the fundamental development of technologies up to industrial scale at the interface between plant engineering, energy industry, waste management, chemical industry and metallurgy. Prior to his appointment as Professor at IEC, he was Scientific Director at Air Liquide for synthesis gas production and combustion. He was also Air Liquide's delegate to the World Economic Forum for Waste Treatment in the Low Carbon Emission Technologies Initiative. During his nine years at Air Liquide, he was based at the Frankfurt Innovation Campus but also had assignments in China. Prof. Gräbner was recognized as Air Liquide's International Senior Expert for gasification.

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Participation at the event is free, but registration is mandatory at this link