
Direct decarbonization of methane by thermal plasma for the co-production of hydrogen and carbon nanostructures

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Résumé

In the context of the large scale deployment of Renewable Energy for green electricity production, plasma processes present a formidable alternative to many high-temperature highly CO₂-emitting processes based on hydrocarbons combustion. In this paper, we discuss the development of a new breakthrough process for the co-production of hydrogen and carbon nanostructures by direct cracking of methane at very high temperatures without direct CO₂ emissions. We first begin with a state of the art review of the plasma development, then we focus our attention on the main scientific stakes and challenges associated with this development, including gas phase particles nucleation and growth, nanosecond mixing, reactive plasma flows and CFD and MHD modelling.

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