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Strategy to synthesize integrated solar energy coproduction processes with optimal process intensification. Case study: Efficient solar thermal hydrogen production

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Abstract

The development and implementation of alternative energy conversion techniques using renewable energy sources is critical for a sustainable economy. Among renewable energy sources, solar energy is prominent due to its abundance. Towards a sustainable economy, this paper presents a process design concept to synthesize Solar Electricity, Water, Food and Chemical (SEWFAC) processes. The proposed approach entails systematic synthesis of energy efficient, synergistic processes incorporating process intensification for optimal utilization of resources. The objective is the development of coproduction processes around the clock on an as-needed basis. A general strategy and detailed analysis to synthesize efficient solar thermal hydrogen production processes through solar thermal power cogeneration. Process simulations and optimizations are performed using an integrated MATLAB and Aspen Plus modeling environment. The proposed process designs are

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