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Developing solid oxide electrolysis cells for CO2 conversion: The Power-to-X critical approach

摘要

用可再生能源替代传统化石燃料是缓解全球变暖的关键举措。然而，太阳能、风能等的随机、波动与间歇的特点给电网带来了重大挑战。电力多元化转换（Power-to-X, P2X）技术在消纳风电、光电中扮演了重要角色。利用高温固体氧化物电解池（Solid oxide electrolysis cells, SOECs）转化 CO2，不仅可以将可再生电力储存在化学品中，而且可以实现碳资源的高效利用。本综述总结了两种通过 SOECs 将 CO2 转化为化学品的途径，并在此基础上，进一步提出了 SOECs 在 CO2 转化领域大规模应用面临的主要挑战和发展方向。

关键词

固体氧化物电解池（SOECs），CO2 转化，电力多元转换（P2X）

Abstract

The substitution of traditional fossil fuels with renewable energy sources is a crucial endeavor for carbon neutrality targets. However, the intermittency of solar, wind, etc. poses significant challenges to the power grid. Power-to-X (P2X) technologies play an essential role in the consumption of renewable energy sources. Using high-temperature solid oxide electrolysis cells (SOECs) to convert CO2 allows renewable electricity to be stored in chemicals, and enables the resourceful utilization of carbon resources. Herein, two pathways for converting CO2 to chemicals via SOECs are summarized. Based on the above discussion and analysis, the main challenges and development directions for the large-scale application of SOECs within the domain of CO2 conversion are further proposed.

Keywords

solid oxide electrolysis cells (SOECs), CO2 conversion, power-to-X (P2X)

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