Preface

Green hydrogen (GH2 or GH2) is hydrogen produced by the electrolysis of water, using renewable electricity. Production of green hydrogen causes significantly lower greenhouse gas emissions than production of grey hydrogen, which is derived from fossil fuels without carbon capture.

Green hydrogen's principal purpose is to help limit global warming to 1.5 °C, reduce fossil fuel dependence by replacing grey hydrogen, and provide for an expanded set of end-uses in specific economic sectors, sub-sectors and activities. These end-uses may be technically difficult to decarbonize through other means such as electrification with renewable power. Its main applications are likely to be in heavy industry (e.g. high temperature processes alongside electricity, feedstock for production of green ammonia and organic chemicals, as direct reduction steelmaking), long-haul transport (e.g. shipping, aviation and to a lesser extent heavy goods vehicles), and long-term energy storage.

As of 2021, green hydrogen accounted for less than 0.04% of total hydrogen production. Its cost relative to hydrogen derived from fossil fuels is the main reason green hydrogen is in less demand. For example, hydrogen produced by electrolysis powered by solar power was about 25 times more expensive than that derived from hydrocarbons in 2018. By 2024, this cost disadvantage had decreased to approximately 3x more expensive.

In the present book, eleven typical literatures about green hydrogen published on international authoritative journals were selected to introduce the worldwide newest progress, which contains reviews or original researches on green hydrogen. We hope this book can demonstrate advances in green hydrogen as well as give references to the researchers, students and other related people.

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