

Preface

Hydrogen has the potential to provide a clean and affordable energy supply that minimizes the dependence on oil, thereby enhancing the global economy and reducing environmental pollution. When used with traditional catalyst technology, onboard hydrogen production using hydrocarbons as starting materials is limited by the heavy weight of the device, a relatively long transient time and fouling, which increases the complexity of the onboard vehicle system. In situ hydrogen production from liquid feedstock using plasma or plasma–catalytic technology is an attractive alternative. In this book, hydrogen production from renewable resources such as ethanol by plasma or plasma–catalytic technologies is reviewed. These technologies have low NO_x emissions and low carbon footprints. Both the plasma and the plasma–catalytic systems have enormous potential for hydrogen production from renewable resources. Experimental studies have demonstrated the promising application of the combination of plasma and catalysts for hydrogen generation due to the synergistic effects. These technologies may offer a shortened learning curve and facilitate the entry of green reforming technologies onto the hydrogen market because of their reforming capacity and efficient hydrogen production. Relevant factors, including the input power, reactor geometry, temperature, carrier gas, and feedstock components, are discussed to better understand the alcohol reforming process using a non–thermal plasma reactor. Several models of alcohol reforming used to evaluate the reforming process are also reviewed. An overview of various plasma reactors and the efficiency of ethanol reforming are also discussed. The performances of the various systems are compared. The reforming efficiencies of different non–thermal arc plasma reactors are also discussed in terms of their characteristics and operating conditions. Finally, the directions of the research regarding the next generation of hydrogen production from fuel reforming are discussed. The future prospects of the plasma–catalytic approach for alcohol are

exciting, and the synergistic effect of combining plasma and catalysts could play an essential role in the future.

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