

Precious Metal Catalysts Supported on Ceramic and Metal Monolithic Structures for the Hydrogen Economy

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Distributed hydrogen for the hydrogen economy will require new catalysts and processes. Existing large-scale hydrogen plants can not simply be reduced in size to meet the economic, safety, and frequent duty cycle requirements for applications for fuel cells, hydrogen fueling stations, and industrial uses such as hydrogenation reactions, gas turbine cooling, metal processing, etc (1, 2). Consequently, there is a need to completely reassess how hydrogen can be made for the emerging hydrogen economy. This article presents some of the technological advantages of precious metal monoliths over traditional base metal particulate catalysts for reforming hydrocarbons, such as natural gas, for the generation of distributed hydrogen.

Keywords Precious metal catalysts, Monolithic structures, Heat exchangers, Natural gas, On-site hydrogen generation, Fueling stations, Fuel cells

1. INTRODUCTION

Precious metal catalysts supported on monoliths offer many advantages over traditional pellet type catalysts. The term monolithic structure is used to include all uni-body structures, the most common being those used for the automobile catalytic converter for pollution control in mid-1970s. Monoliths with precious metal-containing “washcoats” (precious metals dispersed on high area carriers such as stabilized Al_2O_3) have proven to have excellent mechanical and chemical durability, low pressure drop, rapid response to transient operation, and smaller

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