# 磁控溅射制备不锈钢基耐蚀导电薄膜研究进展

冯绅绅，汪　亮，李　斌，余清洲，干蜀毅

（合肥工业大学机械工程学院，安徽　合肥　230009）

**摘　　要**：不锈钢基耐腐蚀导电薄膜被广泛应用于燃料电池双极板等器件，要求具有高的耐腐蚀性和导电性、良好的机械性能、加工成本低等特点。然而，目前的不锈钢基薄膜耐腐蚀性和导电性难以兼得，实现这两种性能的合理匹配，降低生产成本，是金属基薄膜商业化的关键环节之一。本文系统总结了磁控溅射制备不锈钢基耐腐蚀导电薄膜的研究进展，并从制备材料种类、工艺参数等方面进行了详细分析。文末还展望了不锈钢基耐腐蚀导电薄膜的发展方向。

**关　键　词**：耐蚀薄膜；导电薄膜；不锈钢基

**中图分类号**：TG179　　**文献标识码**：A　　**文章编号**：1002-0322(2020)06-0011-07

doi：10.13385/j.cnki.vacuum.2020.06.03

# Research Progress of Corrosion-Resistant and Conductive Films on Stainless Steel Substrate Prepared by Magnetron Sputtering

FENG Shen-shen, WANG Liang, LI Bin, YU Qing-zhou, GAN Shu-yi

(*School of Mechanical Engineering, Hefei University of Technology, Hefei 230009, China*)

**Abstract**: Tainless steel-based corrosion-resistant conductive films are widely used in fuel cell bipolar plates and other devices, which require high corrosion resistance and electrical conductivity, good mechanical properties, and low processing costs. However, it is difficult to have both corrosion resistance and electrical conductivity of the current stainless steel-based films. Realizing the reasonable matching of these two properties and reducing production costs are one of the key points in the commercialization of metal-based films. This paper systematically summarizes the research progress in the preparation of stainless steel-based corrosion-resistant conductive films by magnetron sputtering, and analyzes in detail the types of preparation materials and process parameters. At the end of the article, the development direction of stainless steel-based corrosion-resistant conductive film is also prospected.

**Key words**: corrosion resistant film; conductive film; stainless steel base

社会的发展导致人类对能源的需求日益增加，环境问题不断突出。目前人类消费的能源仍然以不可再生的化石燃料能源为主，其储量有限，使用时会造成严重环境污染，因此化石燃料向绿色能源转变是必然趋势。氢能是公认的绿色清洁能源，燃料电池是氢能源能投入实际应用的关键技术。质子交换燃料电池(PEMFC)是一种新型燃料电池（图 1），其功率密度和能量转化率高、启动速度快、工作温度低，能直接、连续地把化学能转化为电能，理论上的电热转化效率高达 85% ~ 90%[1]。

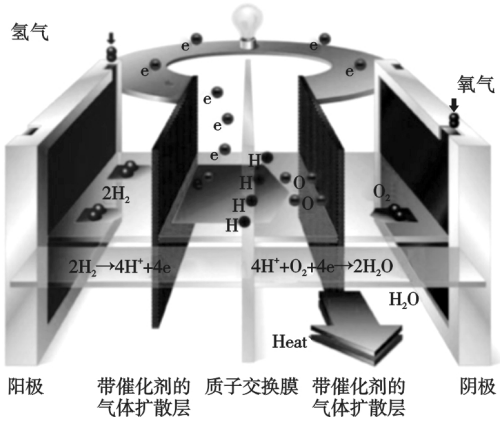


图 1　PEMFC 结构图

Fig.1　Schematic figure of PEMFC[2]

双极板是 PEMFC 的核心部件之一，它的作用

**收稿日期**：2020-07-30

**作者简介**：冯绅绅(1995-)，男，河南省商丘市人，硕士生。　　**通讯作者**：干蜀毅，教授。