

146j Sulfur Tolerant Palladium Copper Membrane System for Hydrogen Separation

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Purified hydrogen is an important fuel source for many energy conversion devices, like fuel cells and is also used in the manufacture of many products including metals, sulfur free fuel cells, edible fats and oils etc. Hydrogen streams produced by fuel processes like steam reformers, autothermal reformers, partial oxidation reactors etc contain substantial amounts of CO₂, CO, H₂O. More importantly significant amounts of sulfur containing compounds like H₂S are also present. Even though Pd membranes have the potential to separate pure H₂ from the effluents of fuel processors, they are poisoned by sulfur and also suffer from mechanical problems caused by hydrogen embrittlement and thermal cycling especially at high pressures. XRD, EDAX and SEM analysis confirmed the homogeneity and integrity of the Pd-Cu alloy membrane. A sulfur tolerant catalyst deposition technique was developed and optimized for typical feeds from autothermal fuel processors.