

Preparation of V-Cr-Y thin film deposited on Ni substrate by RF sputtering

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Membrane separation is one method of separating hydrogen and carbon dioxide converted from the WGS reaction for the purpose of capturing pre-combustion carbon dioxide. If it is possible to capture more than 99.9% of hydrogen and 90% of carbon dioxide using hydrogen separation membrane made of vanadium based components, 10 times more economic efficiency can be achieved compared to using the original, Pd-based membrane. It is confirmed in precedent studies that V-Cr-Y alloy shows high hydrogen permeability and selectivity. In this study, thin film was prepared by sputtering to increase the permeation flux of V-Cr-Y, and their structures under various conditions were studied. Three-components thin film was deposited on Nickel substrate using a alloy target set to 89.8%, 10.0%, 0.2% of V-Cr-Y respectively. The experiment was carried out under various condition to find the optimal thin film growth condition. The made thin film at optimal condition was annealed at 550°C and in H₂, Ar gas atmosphere. The pillar shaped thin film was densified through heat treatment. The components and morphology of thin film according to various conditions were confirmed by EDS, SEM analysis.