Development of Ti-based AB2 type hydrogen storage materials for a metal hydride compressor

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Fuel cell vehicles and hydrogen refueling stations are becoming more widespread to establish a sustainable society. One of the drawbacks is hydrogen compression even though mechanical compressors are well-established and already commercialized. A metal hydride compressor is one of alternative technologies because it can compress hydrogen by waste heat, and it is silent and does not require frequent maintenance. AIST has proposed combined hydrogen compression with a metal hydride and electrochemical techniques. In our concept, metal hydride needs to absorb hydrogen at around 20-30MPa and 30℃ and release hydrogen at about 80MPa when heated to 80℃. In addition, small hysteresis, i.e. the pressure gap between absorption and desorption processes, is one of the key parameters for efficient hydrogen compression. Therefore, we have explored various Ti based AB2 type hydrogen storage materials to understand the control factor for hydrogen pressure and hysteresis.
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