Pure iron has not only a large hydrogen diffusion coefficient, but also it is compatible with molten lithium and both of its oxides and nitrides are well reduced in lithium or hydrogen at several hundreds °C. Thus, a lithium container with a permeation window made of iron was fabricated to measure the pressure change out of the container after hydrogen loading into lithium. The area and the thickness of its permeation window were about 64 cm² and 0.7 mm, respectively. Outside of the container was evacuated to high vacuum and the pressure change after stopping evacuating was observed with a B-A gauge. As a result with lithium contain about 1000 wppm hydrogen over 500 °C, the device was shown to have a high permeation factor which is estimated to be limited only by the hydrogen diffusion in iron, that suggests the surface reactions are smooth at both sides of iron.

The device showed such a fast response that it was used as a real-time hydrogen concentration monitor to observe the hydrogen recovery by an yttrium plate from lithium. 17 g of lithium with 1000 wppm of hydrogen was loaded into the container and one yttrium plate of 30 mm * 10 mm * 1 mm was immersed into lithium. As a result at 500 °C, yttrium plate showed a quick hydrogen absorption regardless the formation of a surface layer thicker than several microns which was abundant in oxygen and nitrogen formed by impurities in molten lithium.