氫氣誘發金屬材料內部負載的分析與模擬

張國益、王啟聖 ；劉大銘

E-mail: 9707293@mail.dyu.edu.tw

摘 要

為了要瞭解氫氣誘發金屬材料內部負載，本研究利用Fluent軟體 來做分析與模擬，分別以氫氣的擴散速度、壓力、濃度與溫度的 關係來討論。 當在速度為0.001m/s時，分析不銹鋼(316、314)、銅和低合金肥 粒鐵不銹鋼三種金屬比較的結果，氫原子在銅晶格內會顯示出所 受的應力較大；而低合金肥粒鐵不銹鋼，溫度升高時，導致氫原 子在晶格內所受的應力下降。而不銹鋼在溫度升高的過程中，氫 原子在晶格內所受的應力會增加。 若速度增加從0.001增加至0.006 (m/s)時，溫度分別固定在373K 、873K與1273K，可觀察出速度越高不銹鋼應力越低，負載越小。 而壓力會與溫度同時說明，當溫度升高時，氫原子會較活耀，造 成碰撞，使壓力升高。增加材料外面的壓力，相對的氫原子在晶 格內所受的應力會增加。 在濃度方面，利用模擬出來的濃度值與實驗溶解度得到的濃度， 可以求得到氫氣進入到材料中時的材料結構應力。當氫濃度增加 時，氫原子在晶格內所受的應力也會隨著增加。

關鍵詞 : 應力 ; 溶解度 ; 濃度

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