노치 시험편에 의한 Glass Ceramic의 파괴인성 평가

노남수† · 박철규 · 김덕회 · 김재훈* · 이영신(충남대) · 문순일**(국방과학연구소)

Evaluation of Fracture Toughness for Glass Ceramics using Notch Specimen

Nam-Su Rho, Chul-Kyu Park, Duck-Hoi Kim, Jae-Hoon Kim, Young-Shin Lee and Soon-Il Moon

Key Words: Ram Jet Engine (램 제트 엔진), Dynamic Fracture Toughness(동적 파괴인성), Strain Gage Method(변형률 측정법), Dome Port Cover (돔 포트 커버), SEPB(선균열 도입 파괴 시험법), SENB(노치 파괴 시험법)

Abstract : The objective of this study is to evaluate for the mechanical properties and fracture toughness of glass ceramic for dome port cover of the ramjet engine. Static and dynamic fracture toughness tests are used in SEPB and SENB method. SENB method is tested according to the various notch radius. Static and dynamic fracture toughness tests are performed using the strain gage method. The evaluation method of dynamic fracture toughness of glass ceramic is validated by using strain gage method.

Zr-2.5Nb 압력관의 연성-취성 천이 거동

김영석†(한국원자력연구소) · 안상복 · 김강수 · 오동준**(안동대)

Ductile to Brittle Transition Behavior of Zr-2.5Nb Pressure Tubes

Young Suk Kim, Sang Bok Ahn, Kang Soo Kim and Dong Joon Oh

Key Words: Zr-2.5Nb pressure tubes (Zr-2.5Nb 압력관), Fracture toughness (파괴인성), hydrides (수소화물), Fissure (피셔).

Abstract : Fracture toughness tests were carried out at temperatures ranging from RT to 300 °C on compact tension specimens of the Zr-2.5Nb containing up to 200 ppm H. Hydrides drastically decreased fracture toughness resistance, dJ/da of the Zr-2.5Nb pressure tube at RT along with the formation of fissure and provided little effect on it at higher temperatures larger than 200 °C along with no fissures fomred. A ductile-brittle transition temperature lay in the temperature range of 130-180 °C. Fracture toughness resistance of the Zr-2.5Nb tube at RT decreased with increasing concentration of hydrogen and got saturated to a constant when the hydrogen concentration was larger than 70 ppm and the fissures were larger than 450 m. Fracture toughness of the Zr-2.5Nb tube was concluded to be strongly related to the formation of the fissures caused by the fracture of hydrides. The ductile-to-brittle transition behavior for the Zr-2.5Nb tube with hydrogen concentration and heat treatment conditions is discussed in association with the γ- to δ -hydride phase transition, which causes the maximum fracture toughness of the as-received Zr-2.5Nb tube at 180 °C.