

ECAP Al2024 합금의 소성변형량에 따른 강도 변화

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Strength Change Due to Amount of Plastic Deformation in ECAP Al2024 Alloy

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Key Words: Small Punch Test(소형편치시험), ECAP(등통로각압축법), Al 2024(알루미늄2024) Nanostructured Metal(나노구조재료), Strength Assessment(강도평가), Anisotropy(이방성)

Abstract : Strength change of an over-aged Al2024 alloy was studied after being subjected to several stages of severe plastic deformation by ECAP (Equal Channel Angular Pressing). Various kinds of strength value were measured using the conventional tensile test, Rockwell and Vickers hardness and the SP (small punch) test. Due to limitation of the specimen size, tension test in transverse direction could not be conducted. Hence, SP test was employed for assessing the strength in transverse direction. As the number of ECAP pass increases, the strength of Al2024 was increased. However, after 6 passes of ECAP even decrease of the strength in transverse direction was observed. It was argued based on TEM observation that this decrease was due to dynamic recovery of dislocation density during or after ECAP processes at 150°C. The strength assessment equation proposed by the authors in the previous study was supported by comparing the results of conventional tensile test with those of SP test.

고온가스로용 Hastelloy-X 강의 고온 인장 및 크리프 특성

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High Temperature Tensile and Creep Properties of Hastelloy-X Superalloy for the HTGR

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Key Words: Hastelloy-X, Tensile (인장), Creep (크리프), High Temperature Gas Cooled Reactor (HTGR, 고온가스로), Superalloy (슈퍼알로이)

Abstract : The design of the metallic components for a high temperature gas cooled reactor (HTGR) such as hot gas ducts, intermediate heat exchanger (IHX) tube, and steam reformer tubes is principally determined by the mechanical strength values of the tensile and creep properties. The tensile and creep data for candidate alloys are needed to design the structural components operated at 900 to 1000°C. Hastelloy-X is a candidate heat-resistant alloy for the HTGR. In this study, the tensile and creep properties were investigated at the high temperature test conditions; 600 to 1000°C in tensile and 950 °C in creep. A lot of data were collected through literature survey, and the data were analyzed in the viewpoint of the design of the HTGR structures.