# EFFECT OF EQUAL CHANNEL ANGULAR PRESSING DIE ANGLE ON CORROSION BEHAVIOR OF BULK NANOSTRUCTURED METAL

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## ABSTRACT

Equal channel angular pressing technique was used to process bulk nanostructured commercial pure titanium Cp2(Ti Cp2) and aluminium alloy 6061(Al6061). The samples were processed at two different die channel angles of 120 º and 126 º. Hardness test shows that the hardness for Al6061, using channel angle 120° ECAP-ed, has increase 15.55% while using channel angle 126° the increase was 14.89% compared to non-ECAP-ed sample. Hardness test for Ti Cp2 ,using channel angle 120° ECAP-ed has increase 32.89% while using channel angle 126° the increase was 27.05%. The hardness for this both materials have shown that Ti Cp2 has higher hardness compared to Al6061 since the highest increment is 5.84% for 120°ECAP-ed than 126°ECAP-ed for Ti Cp2 samples. The corrosion behavior of the ECAP-ed Al6061 was investigated in 3.5% sodium chloride (NaCl) solution relative to seawater concentration while Ti Cp2 was investigated in phosphate buffered saline (PBS) solution. Corrosion resistance on 120° ECAP-ed for both Al6061 and Ti Cp2 have shown improved corrosion behavior indicated by the least value of corrosion current density when compared to non-ECAP. By using channel angle 120°, Al6061 have shown the lowest corrosion current density (Icorr) value of 1.61E-7 while Ti Cp2 has also shown lowest Icorr value of 1.19E-08. This means ECAP-ed using 120° is the most noble sample with lowest corrosion value, when applied with current, among all samples.

## KEYWORDS

Pure Titanium, Aluminium alloys, Equal Channel Angular Pressing (ECAP), corrosion behavior, mechanical properties

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