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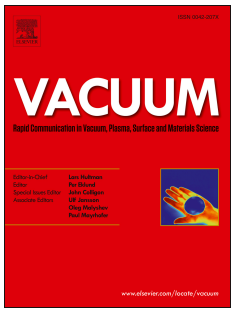

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Fast Production of High Entropy Alloys ($CoCrFeNiAl_xTi_y$) by Electric Activated Sintering System

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ABSTRACT

Electric current assisted sintering (ECAS) can be a new production method for high entropy alloy production due to its advantages such as low sintering temperature and short holding time. In this study, production of CoCrFeNiAlxTiy alloys (x:0.5, y:0,05, 1; y:0.5, x:0, 1) was carried out in electric current activated/ assisted sintering system in open air with a uniaxial contact pressure of 35 MPa at 2500 A for 5 min. Microstructural and micro hardness properties of samples are determined. After sintering, depending on the composition, solid solution phases such as FCC (FeNi), BCC (FeCr) were formed in all alloys. In alloys other than $CoCrFeNiAl_{0.5}$, sigma and Al-Ni-Ti intermetallic phases are formed. According to SEM-EDS analyses, the elements with high negative mixing enthalpy are gathered together and the dark phases are enriched from the Al-Ni-Ti, while the Fe-Cr is precipitated due to its high concentration around this phase. Thanks to intermetallic phases formed by the lattice distortion of Al and Ti elements with high atomic radius, the hardness was obtained as 401HV in $CoCrFeNiAl_{0.5}$ alloy and 700HV in $CoCrFeNiAl_{0.5}Ti_{0.5}$ alloy. Alloys were subjected to homogenization heat