

## Concentrated Solar Energy Sintering of Multifunctional Metallic Alloys

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**Abstract :** Employing concentrated solar energy (CSE) for sintering metallic parts offers distinct advantages, notably in the rapid thermal cycling that significantly influences their microstructure and phase transitions. This study uses the thermal control that CSE affords, enhancing the mechanical properties and tailoring the functionality of nickel-based alloys. We synthesized bulk alloys by sintering Ni-Cr-Al-Y powders in varied ratios using a vertical solar furnace at PROMES-CNRS, Font-Romeu Odeillo, France. The process achieved optimal fusion at 800°C for 10 minutes, resulting in materials with a notable hydrophilic surface due to oxide formation. The alloys' performance was evaluated through corrosion resistance tests in a 3.5% wt. NaCl solution, utilizing potentiodynamic scanning and electrochemical impedance spectroscopy. Our findings demonstrate the potential of CSE in advancing the material properties of nickel-based alloys for diverse applications.

**Keywords :** concentrated solar energy, sintering, corrosion resistance, surface properties

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