Phase Transformation of Ag-Cu Alloy Nanoparticle Embedded in Ni Matrix

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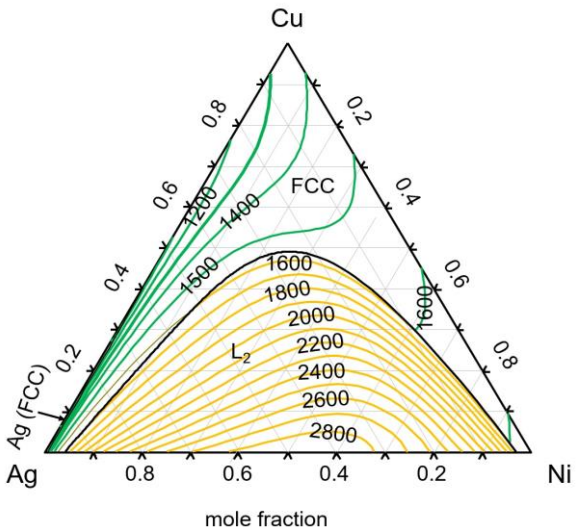
OBJECTIVES

- Different (Ag-Cu) nanoalloy particles are embedded in Ni matrix, prepared by melt spinning technique; Ni-6wt %(Ag-wt%15Cu) (ACN-HYPO), Ni-6wt %(Ag-wt%28.15Cu) (ACN-EU), and Ni-6wt %(Ag-wt%85Cu) (ACN-HYPE), respectively
- An attempt to comprehend their alloying effect, melting, and solidification kinetics of these nanoalloys particles with the matrix.
- To probe the alloying behaviour, one of the phases was selected to be miscible and the other phase being immiscible with the matrix.

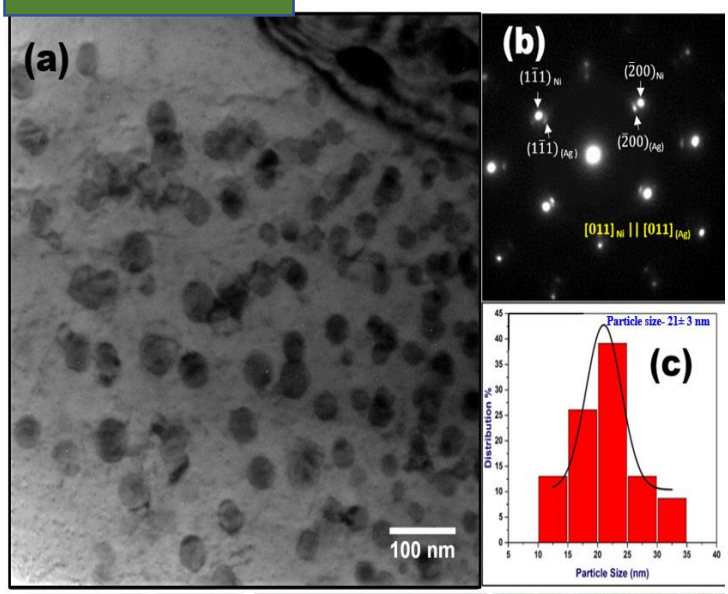
Ag-Cu-Ni PHASE DIAGRAM



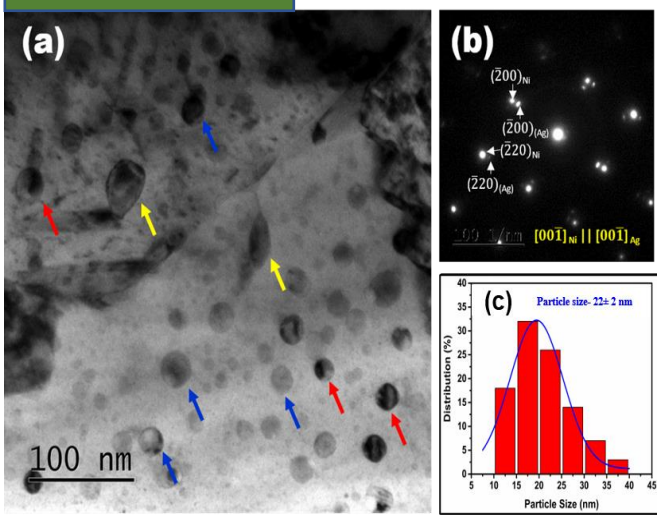
CHARACTERIZATION

TEM STUDY

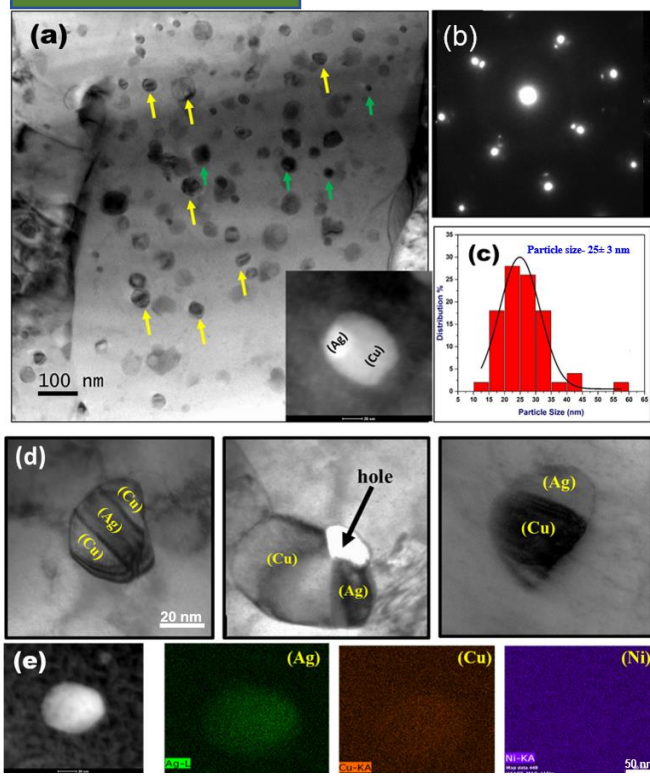
ACN-HYPO



ACN-EU



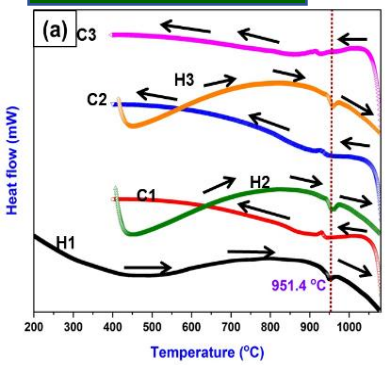
ACN-HYPE



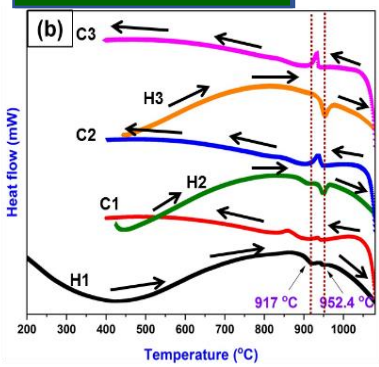
Differential Scanning Calorimetry (DSC)

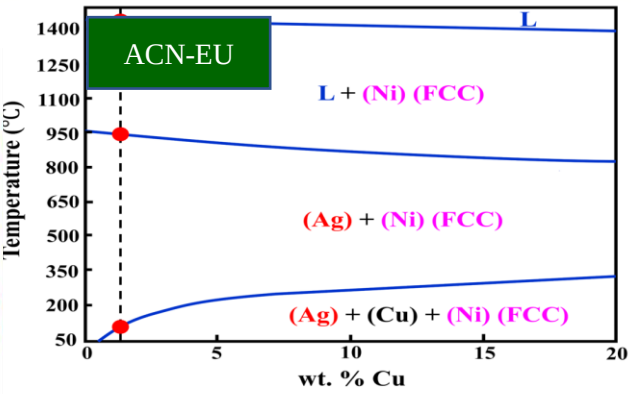
Theoretical Calculation

ACN-HYPO

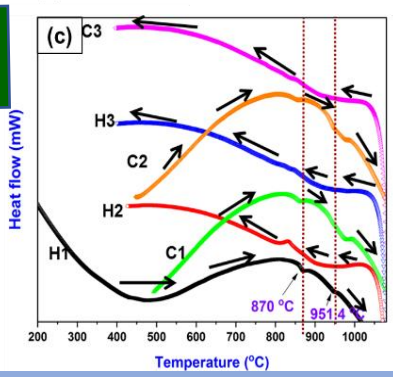


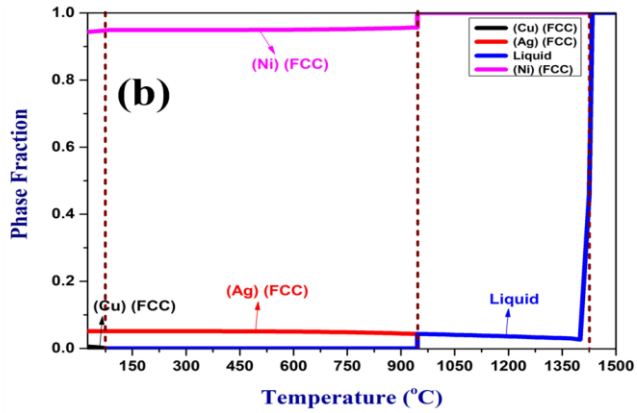
ACN-EU



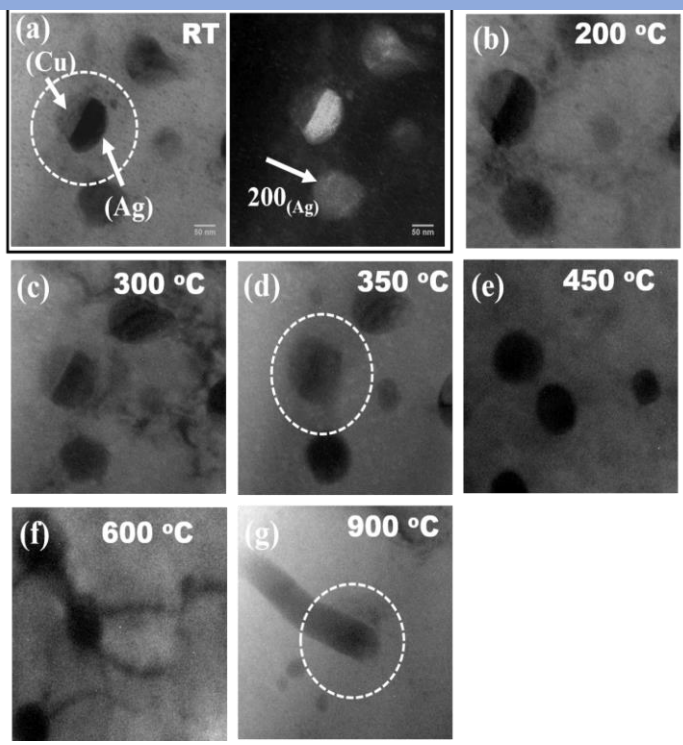


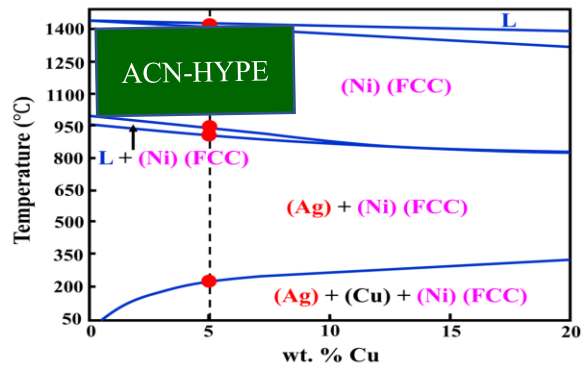
ACN-HYPE

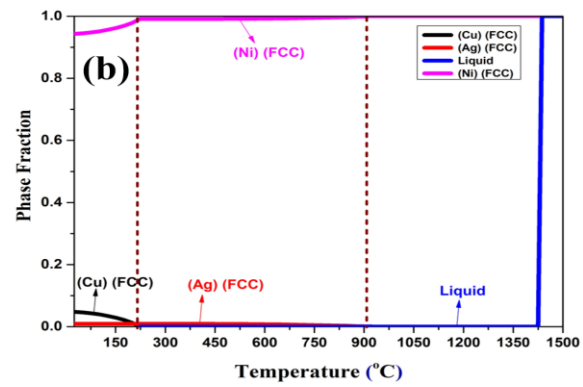




In-situ TEM Study







CONCLUSIONS

- ✓ Microstructural result reveals that the ACN-HYPO and ACN-EU nanoalloys exhibit a single phase of (Ag) solid solutions, whereas the ACN-HYPE alloy contains bi-phasic (Cu)-(Ag) alloy nanoparticles.
- ✓ *In-situ* TEM, biphasic nanoparticles to single-phase (Ag) nanoparticles prior to melting during heating. As the temperature rises, the solid (Ag) is entirely converted into a liquid .
- ✓ The nanophase diagrams for the all three nano alloys reveals that the Cu is fully soluble in the Ni matrix. However, upon heating, the (Ag) nano particle persists in the microstructure and forms a (Ag) rich liquid phase with different solubility of Cu and Ni depending on the nano alloy composition.