Microstructural and Thermal Characterization of Atomized $Fe_{43.2}Co_{28.8}B_{19.2}Nb_4Si_{4.8}$ Powders

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Abstract. Bulk glassy alloys based on the Fe-Co-B-Si-Nb system have already achieved high levels of mechanical strength and high glass forming ability when processed by copper mold casting. The present work investigated the glass-forming ability and characterization of $Fe_{43.2}Co_{28.8}B_{19.2}Nb_4Si_{4.8}$ alloy overspray powders produced by spray forming. The powders were characterized in relation to the morphology and surface appearance. The thermal stability and glass forming ability was evaluated using thermal parameters, such as; glass transition temperature (T_g), supercooled liquid region (ΔT_X), melting temperature (T_m) and liquidus temperature (T_L). An amorphous structure was confirmed by the X-ray diffraction (XRD) and scanning electron microscopy (SEM) methods. The thermal properties of the studied powders were examined by differential scanning calorimetry (DSC). The smaller particles showed preferentially a smooth surface whereas larger particles tended to have a rough surface. It was also observed minor variations in the thermal parameters with variation in the size of the powder particles.

Keywords: Amorphous alloys, Fe-Co-B-Si-Nb system, Atomized powders.