

**PRELIMINARY RESEARCH ON LAMINATE ULTRASONIC WELDING FOR
FABRICATION OF SANDWICH COMPOSITE FROM AMORPHOUS RIBBONS
AND CRYSTALLINE COOPER FOILS**

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Abstract

With the evolution of society new materials or classes of materials must be developed. The lack of crystalline structure from the amorphous ribbons favors mechanical and electrical properties. The homogeneous structure of amorphous metal alloys offers unique mechanical, anti-corrosive, wear-resistant and magnetic properties, which makes them superior in many applications compared to the crystalline metals that have the same composition.

Yet, the major problem of amorphous metal alloys is their metastable character, these alloys being used only at low temperatures, but by introducing crystalline copper in the fabrication of sandwich composites, the usage temperature would increase.

In this study we present the results on the use of ultrasonic laminate welding for the fabrication of amorphous - crystalline composite materials.

Hybrid multilayer ultrasonic joints of the amorphous metal alloy with a thickness of 25 μm , having the chemical composition 87.2% Ni, 4.2% Fe, 1.3% Cr, 4.5% Si, 2.8% B and crystalline copper with 99.99% purity, with a thickness of 15 μm , were achieved. The amorphous ribbons were produced by the "Planar flow casting" process and the joint was made with an ultrasonic assembly at a frequency of 20 KHz.

The combined samples were characterized by X-ray diffraction (XRD), scanning electron microscopy (SEM), and Vickers micro-hardness.

Keywords: ultrasonic welding, amorphous ribbons, composite.