

## **Crystallization kinetics and fragility of al-based amorphous alloy**

### **Abstract**

Crystallization among amorphous alloy is a crucial study since it generally affects its properties, which may be detrimental or beneficial, depending on the intended application of the materials. Controlling crystallization is crucial for obtaining the desired properties. The crystallization study was performed using differential scanning calorimeter (DSC). Samples were heated at heating rates between 20 and 40 K·min<sup>-1</sup>. Structural evolution during crystallization was studied using X-ray diffraction (XRD). Apparent activation energy for each temperature characteristic was determined using Kissinger's equation. Local Avrami exponent was investigated using the modified Johnson-Mehl-Avrami-Kolmogorov equation. Liquid fragility, which indicates the strength of glass formation, was predicted using temperature characteristics instead of its viscosity. It was found that upon crystallization both as-cast samples crystallize to cubic-Al, Al<sub>2</sub>CuMg and Al<sub>2</sub>Cu and Al<sub>3</sub>Ni. Alloy with composition of (Al<sub>75</sub>Cu<sub>17</sub>Mg<sub>8</sub>)<sub>95</sub>Ni<sub>5</sub> shows superior activation energy at every temperature characteristic than alloy with composition of Al<sub>75</sub>Cu<sub>10</sub>Mg<sub>8</sub>Ni<sub>7</sub>. Local Avrami exponent and local activation energy for (Al<sub>75</sub>Cu<sub>17</sub>Mg<sub>8</sub>)<sub>95</sub>Ni<sub>5</sub> show high values at the beginning and at the end of the crystallization process. From liquid fragility, it was predicted that the samples are stronger glass formers than previously studied Al-amorphous alloys.