Laser processing of La61.4Al15.9Ni11.35Cu11.35 based functionally graded material bulk metallic glass

Qayyum Halim[1], Nik Abdullah Nik Mohamed[1], Mohd Ruzaimi Mat Rejab[1], Mohd Kamal Kamarulzaman[2], Sakinah Hisham[1], and A.M. Aizzuddin[3]

[1] Faculty of Mechanical and Automotive Engineering Technology, Universiti Malaysia Pahang, 26600 Pekan, Pahang Darul Makmur, Malaysia

[2] Advanced Nano Coolant-Lubricant (ANCL) Lab, Automotive Engineering Centre, Universiti Malaysia Pahang, 26600 Pekan, Pahang Darul Makmur, Malaysia

[3] College of Engineering, Universiti Malaysia Pahang, 26600 Pekan, Pahang Darul Makmur, Malaysia

mqa.qayyum@gmail.com; kamalkz@hotmail.com

ABSTRACT

Bulk metallic glass (BMG) based on lanthanum is one of the BMG with exceptional glass-forming ability (GFA). The La61.4Al15.9Ni11.35Cu11.35 bulk metallic glasses were treated to a laser processing test in this experiment. The results showed that the best power, frequency, and speed ranges for laser processing of the La61.4Al15.9Ni11.35Cu11.35 BMG samples are 40 – 50 W, 160 – 240 kHz, and 200 – 400 mm/s, respectively. As a result, the current work was effective in producing the Lanthanum-based functionally graded material (FGM) BMG. The positive findings on the laser's microstructural or morphology, give a solid foundation for future advancement research on the La61.4Al15.9Ni11.35Cu11.35 BMG.

KEYWORDS

La-based BMG; Functionally graded material bulk metallic glass; Laser processing

ACKNOWLEDGEMENTS

The authors are grateful to the Ministry of Education Malaysia: FRGS/1/2017/TK05/UMP/01/1. Ministry of Science, Technology and Innovation (MOSTI), Malaysia SMD, Universiti Malaysia Pahang: 03-01-02-SF0257. The research work is strongly supported by the Advanced Structural Integrity and Vibration Research Group (ASIVR) and Structural Materials & Degradation (SMD) Focus Group, Faculty of Mechanical and Automotive Engineering Technology, University Malaysia Pahang. “Mohd Kamal bin Kamarulzaman” is the recipient of the UMP Post-Doctoral Fellowship in Research.