

Measuring the Thermal Conductivity of Polyurethane with Various Admixtures of Aluminum Nitride Nanoparticles

Marian Janek^{1, a)}, Jozef Kudelcik¹, Stefan Hardon,¹ and Rastislav Igaz²

¹*Department of Physics, Faculty of Electrical Engineering and Information Technology, University of Žilina, Univerzitná 8215/1, 010 26 Žilina, Slovak Republic*

²*Technical University in Zvolen, Faculty of Wood Sciences and Technology, Department of Wood Technology, T. G. Masaryka 24, Zvolen, SK-96001, Slovak Republic*

^{a)} Corresponding author: janek@fyzika.uniza.sk

Abstract. Study focuses on the measurement of thermal conductivity in polyurethane (VUKOL Magna blue) containing varying proportions of aluminum nitride nanoparticles (10%, 20% and 50%). The incorporation of nanoparticles into polyurethane matrices holds promise for enhancing thermal properties and extending potential applications in fields such as thermal insulation and heat management. By systematically altering the nanoparticle concentration, the thermal conductivity of the composite materials was investigated. Experimental measurements were conducted using plane heating element, two thermistors for temperature measurement and developed electronics for data acquisition. The setup for measuring the thermal conductivity of polyurethane composites with various admixtures of aluminum nitride nanoparticles is described and results are discussed.

ACKNOWLEDGMENTS

This work was supported by the Grant System of University of Zilina No. 1/2023 (18735) and the Slovak Research and Development Agency under the contract No. APVV-21-0078 and APVV-21-0449.