

Improvement of the Mechanical and Thermal Properties of Thermoplastics Reinforced with Natural Fibers by Electron Beam Processing

S.W. Kim^{C,S}

*Department of Physics, University of Ulsan, Ulsan, Korea
sokkim@ulsan.ac.kr*

S.H. Lee

Division of Physical Metrology, Korea Research Institute of Standards and Science, Daejeon, Korea

J.S. Kang

Building Research Division, Korea Institute of Construction Technology, Gyeonggi-Do, Korea

K.H. Kang

Korea Atomic Energy Research Institute, Yusong, Daejeon, Korea

Thermoplastics reinforced with the natural fibers jute, kenaf, flax etc. have a great potential for wide application in many fields, because of their reasonable price, light weight, high formability, superior elasticity, and high recycling probability. Regardless of the many advantages, one shortcoming is the deformation, after the formation of the thermoplastic, at high temperatures of about 200 °C, caused by the poor adhesion between the natural fibers and the thermoplastic. Also, energy conservation in connection with car air-conditioning has become very important; thus, the study of the mechanical and thermal properties by chemical reactions and micro-damages in the surfaces caused by electron beam radiation, has become momentous.

In this study, the thermal conductivity and tensile strength of several kinds of thermoplastic composite boards composed of 50 % polypropylene (PP) and 50 % natural fiber (NF) processed by an electron beam (energy: 10 keV, dose : 0 ~ 20 kGy). The length and thickness of the PP and NF are on the order of 10 mm and 40 - 120 μ m, respectively. The results show that the thermal conductivity and the tensile strength were improved by increasing the energy and dose of the electron beam, and they were explained by the SEM photograph of the samples. These results will be utilized as the data for energy saving in automobiles with the relation of cooling and heating in harsh environments.