Mechanical and thermal properties of reprocessed ABS with its improved impact property by blending with NBR

Poonsub Threepopnatkul\textsuperscript{1,}\textsuperscript{*}, Pathuthip Tongtun\textsuperscript{1}, Rawipreeya Suesuan\textsuperscript{1}, Saikhim Panawes\textsuperscript{1},
Chanin Kulsetthanchalee\textsuperscript{2}

\textsuperscript{1}Department of Materials Science and Engineering, Faculty of Engineering and Industrial Technology, Silpakorn University, Nakhon Pathom 73000, Thailand
\textsuperscript{2}Event and Exhibition Design, Suan Dusit University, Bangkok 10300, Thailand
*E-mail: poonsubt@yahoo.com

Abstract: In this research, the mechanical and thermal properties of reprocessed ABS were investigated. The ABS was subjected to be reprocessed at 3, 5 and 7 cycles using twin screw extruder at 220 °C. From the study of thermal decomposition using thermo-gravimetric analyzer, the decomposition temperatures of ABS with 3 and 5 reprocessed cycles possessed lower decomposition temperature than neat ABS. However, ABS with 7 reprocessing cycles surprisingly showed the same degradation temperature as the one of neat ABS. Two decomposition steps were found in both ABS with 5 and 7 reprocessing cycles. This is presumably attributed to that the formation of crosslink had occurred. Comparing the mechanical properties of reprocessed ABS with neat ABS, the impact strength and elongation at break decreased but tensile strength and modulus had no significant changes. The impact property of reprocessed ABS was improved by adding nitrile butadiene rubber (NBR). After adding NBR of 5, 10, 15 and 20\%\text{wt}, the impact strength of ABS with 5 reprocessing cycles was higher than the one of 7 and 3 reprocessing cycles. This can be due to a formation of C-O-C cross-linking between NBR and reprocessed ABS leading to an improved absorbability of impact energy.

Keywords: Acrylonitrile-butadiene-styrene; Reprocessed; Nitrile butadiene rubber