The effect of plastic waste sorting quality on recycled polypropylene performance

Belyamani Imane, Barbier D, Laanaya A, Vauloup J, Janeau L and **Cauret L**
Plastics Engineering Institute of Alençon, France

Post-consumer waste electrical and electronic equipment (WEEE) is becoming a significant source of plastic wastes because of the short useful life of electrical and electronic equipments, and also their increased production as a consequence of the fast technological innovation and market growth. Recycling plastics from WEEE is an important waste management strategy; however, plastic waste sorting is a real challenge and a critical step. In fact, the sorting quality of recyclable plastics influences not only the mechanical and physicochemical properties of the final recycled materials, but also may causes various toxic volatile organic compounds (VOCs) to be released during melt processing stages. Indeed, during the injection molding of WEEE recycled polypropylene (PPrec), employees from our collaborator plant facility noticed that some PPrec batches release undesirable odors. Investigation on PPrec performance and VOCs composition as function of waste sorting quality revealed surprising and interesting results. Inodorous PPrec batches, resulting from a high quality waste sorting, showed better tensile strength, Izod and Charpy properties as compared to the odorous batches (coming from a bad sorting) for which the char formation was found to be more important. The char formation data agreed very well with the X-ray fluorescence results displaying the presence of 0.1790 wt.% of bromine element in odorous batches versus 0.0362 wt.% only in inodorous ones, which signifies a high concentration of brominated components in the odorous batches. On the other hand, in contrast to inodorous PPrec and a commercial virgin PP, a laboratory scale heating system coupled to Fourier transform infrared spectroscopy (FTIR) suggested that the released VOCs from odorous PPrec pellets contain potential bisphenol-derived compounds. Thus emerged the hypothesis that compounds such as tetrabromobisphenol and brominated epoxy resins, which are highly used as flame retardants, could be responsible for the odorous VOCs released from odorous PPrec during injection molding.

Speaker Biography

Belyamani Imane is currently an assistant professor at the plastics engineering institute of Alençon (ISPA) located in Alençon/France. She previously worked as a research associate, at the school of polymers and high performance materials at the University of Southern Mississippi/USA, and as a postdoctoral fellow at Rouen University, France where she contributed to the development of the CARMAT artificial heart. She received her Ph.D in Chemistry and Material Science from Jean Monnet University in Saint-Etienne, France in 2011. Her research interests include plastic recycling, biopolymers and bio-composites, and fire retardants.

e: imane.belyamani@gmail.com

Notes: