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S. BAUMANN, B. ULMER, M. LANG, T. HOCHREIN, M. BASTIAN, O. ADRIAN, G. KÖRBER

TPS for extrusion-based 3D printing – A new material class for the most widely used additive manufacturing process 232

The use of extrusion-based 3D printing in both industrial and private areas has grown significantly and the range of processible materials was considerably broadened. However, TPS have still not been available for this additive manufacturing process. Within the scope of a research project, TPS grades with hardness down to 60 Shore A were developed, opening up new application areas for extrusion-based additive manufacturing from soft and elastic printed parts to two-component objects with hard/soft combination.

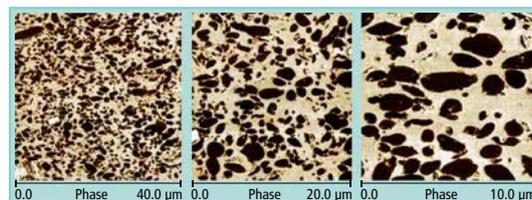


Dog bones with BBQ aroma and much more 235

W. V. MARS, M. D. ELLUL

Fatigue characterization of a thermoplastic elastomer 236

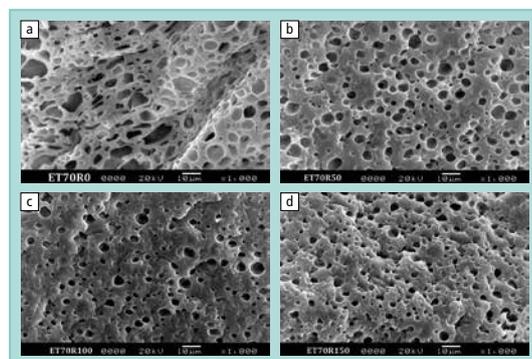
The capacity to resist crack development in an olefinic thermoplastic elastomer (TPE) has been measured via a set of experiments that quantify: 1) the fracture mechanical strength of the material under quasi-static loads, 2) the rate of growth of a crack under dynamic solicitations as a function of the energy release rate, and 3) the size of crack precursors in new material. Because the subject TPE exhibited strong inelasticity in the stress-strain response, it also was necessary to characterize the development of inelastic set under cyclic loading as a function of the applied strain. Combined with the multiplicative kinematic split, this additional measurement yields the elastic part of the strain. It also enables engineering calculations to be made of fatigue life.



J. DUTTA, T. CHATTERJEE, K. NASKAR

Exploring electron beam irradiated EVA/TPU blends for cable applications 243

The effects of electron beam radiation (EBR) on the blends of ethylene vinyl acetate/thermoplastic polyurethane (EVA/TPU) at two different blend ratios prepared via melt blending technique were investigated. All the samples were irradiated by using a 2.5 MeV electron beam accelerating energy over a dose range from 25 to 200 kGy. The blends exhibit drastic improvement in the mechanical properties with increasing radiation dose up to an optimum dosage, beyond which the properties began to deteriorate. Modification of the blends via EBR enhances the elastic recovery of the blends resulting in a significantly improved tension set behaviour. Dynamic mechanical analysis (DMA) was conducted to investigate the change of loss tangent and storage modulus with varying radiation dose. Thermogravimetric analysis (TGA) suggests that irradiation induced crosslinks also help to improve the thermal stability of the blends to some extent. Scanning electron microscopy (SEM) study was performed to explore the changes in morphology before and after irradiation. All the irradiated blends have higher electrical resistivity than the blends without irradiation and the volume resistivity increases up to 150 kGy. The samples were found to exhibit remarkable improvement in oil resistance after irradiation which is more prominent in EVA/TPU 70/30 blends.



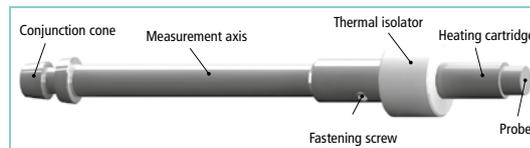
Safe material inspection and sorting for medium and high-voltage cable production 250

D. F. TREFFER, J. G. KHINAST

Why hot melts do not stick to cold surfaces..... 254

Many industrial polymer processing operations (e.g., extrusion, injection molding, etc.) include solid-to-liquid or liquid-to-solid phase changes at non-isothermal interfaces. Stickiness (tack) can occur depending on the process conditions. However, prediction of tack formation is not trivial. This work presents a hypothesis for tack formation between molten polymers and solids under non-isothermal conditions. Our hypothesis states that strong adhesion requires wetting (and thus surface creation) at the interface upon contact and, consequently, contact temperatures above the polymer's solidification point. Lower contact temperatures result in a solid-solid interface with negligible adhesion.

It was suggested that the contact temperature determines the existence or non-existence of surface sticking. The hypothesis was supported by non-isothermal tack experiments, which show that the change from stickiness to non-stickiness is surprisingly pronounced with changing surface temperature of the solid material. From a practical perspective, the work may be useful both for professionals (e.g., designing new processing equipment and performing process troubleshooting) and home users (e.g., working with hot melt glue or 3d printers).

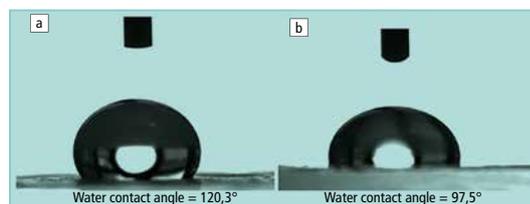


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P. MANDAL, S. PONNUPANDIAN, S. CHOUDHURY, N. SINGHA

Tuning properties and morphology in high vinyl content styrene-butadiene-styrene (SBS) block copolymer via thiol-ene modification..... 262

This investigation reports the thiol-ene modification of high vinyl content styrene-butadiene-styrene (SBS) block copolymer (BCP) in toluene at 70 °C using different thiolating agents. 1H NMR analysis confirmed the participation of vinyl double bond in thiol-ene modification reaction of SBS. Surface morphology of the block copolymers evaluated by AFM analysis showed higher roughness after thiol-ene reaction. The thiol-modified SBS block copolymer showed better adhesion strength and oil resistance properties than the pristine SBS.



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