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Mechanical and thermal properties of polyethylene modified with different natural fillers

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The interest in modified polymers, especially filled waste coming from renewable sources, and in their properties is still increasing because of a wide range of possible applications and a significant role in limiting the emission of CO_2. The use of natural materials as fillers in thermoplastics brings both economic and environmental benefits. The study reports the results of an investigation of basic mechanical and thermal properties of low-density polyethylene modified with three types of natural fillers: wheat bran, pumpkin seed and peanut hulls obtained from food industry waste products. The mass content of the above-mentioned fillers equaled from 0 to 20% relative to the matrix, while the grain size varied from 0 to 0.8 mm. The polyethylene used for studies was linear low-density polyethylene in the form of a powder of trade name Dowlex 2631.10EU, manufactured by the Dow Chemical Company. The paper reports the results of an investigation of the mechanical properties, i.e., strength properties determined by static tensile testing and hardness measurement, of injection molds produced at constant processing parameters. The dependences between tensile modulus, maximum tensile stress, tensile stress at yield, maximum tensile strain, tensile strain at yield as well as shore hardness and weight participation of powdered natural filler and grain size of the filler were defined. Out of thermal properties, vicat softening point and heat deflection temperature were determined.

Biography

Janusz W. Sikora graduated from Lublin University of Technology in 1990 and currently is working as a full professor. He is an expert in the field of polymer processing, especially in polymer extrusion and injection molding, as well as in the design of plasticizing systems. He is an author of more than 300 scientific publications, monographs, and patents. He has a big experience in the implementation of innovative solutions and cooperation with the industry sector. He was a Coordinator of two international research-training projects financed by Research Executive Agency both in 7FP and in Horizont 2020. He transfers his knowledge and experience to colleagues by organizing many workshops, training and courses to enrich and increase knowledge and skills.

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