

Effect of silica bodies on oil palm fibre-polyethylene composites

ABSTRACT

The influence of natural protrusion, also known as silica bodies, was studied in relationship to sliding resistance reinforcement in an oil palm fibre-polyethylene composites. Experimental work on oil palm fibres-LLDPE composites (using fibres with and without protrusions) was conducted, which included x-ray microtomography (μ -CT scan), scanning electron microscopy, and degree of grafting analyses. A finite element micromechanical model was then developed using information from the experimental results to simulate fibre pull-out from the matrix. Microscopic observation after mechanical tests of the composites showed crater marks due to silica bodies in contact with the matrix, whereas fibres were uniformly distributed inside the matrix from the μ -CT scan. Likewise, the degree of grafting analysis showed a positive influence of silica bodies as an additional reinforcement to the composites. These were further supported by the modelling results of fibre pull-out, which showed a clear difference between models with and without silica bodies.

Keyword: Composites; Reinforcement; Modelling; Simulation