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Abstract	:	Polyethylene terephthalate (PET) is a common engineering thermoplastic. Thus, higher waste was generated. Recycled PET (rPET) has poorer properties as a result of degradation during recycling and/or residues contamination from the residues present on the rPET. One of the approaches to improve the mechanical properties of rPET is by incorporating a filler material. Biochar (BC) is a sustainable filler obtained from the pyrolysis of biomass. The focus of this paper is to investigate the applicability of oil palm frond-based BC (OPF-BC) in reinforcing effect of rPET at the loading range of 0–40 wt%. FTIR results showed the absence of any new chemical structure from the melt mixing of rPET with OPF-BC. Thus, DSC analysis does not show any significant difference in the glass transition temperature (Tg) and melting temperature (Tm), but a variation on melting capacity as evidenced forms the melting enthalpy (ΔHm). ΔHm was reported to be consistent with the increment of OPF-BC loading. It is postulated that the variation on the bio-composites ΔHm is a result of higher thermal conductivity of OPF-BC in comparison with the matrix. X-ray diffraction (XRD) analysis reported a significant variation in crystallization characteristics of the bio-composite with the OPF-BC loading. This suggesting that the porous OPF-BC might be acting as the nucleating agent and affects the degree of crystallinity. Based on DMA, the presence of OPF-BC affected the viscoelasticity. No obvious trend was observed on the storage modulus (E'), loss modulus (E''), and damping (tanδ).