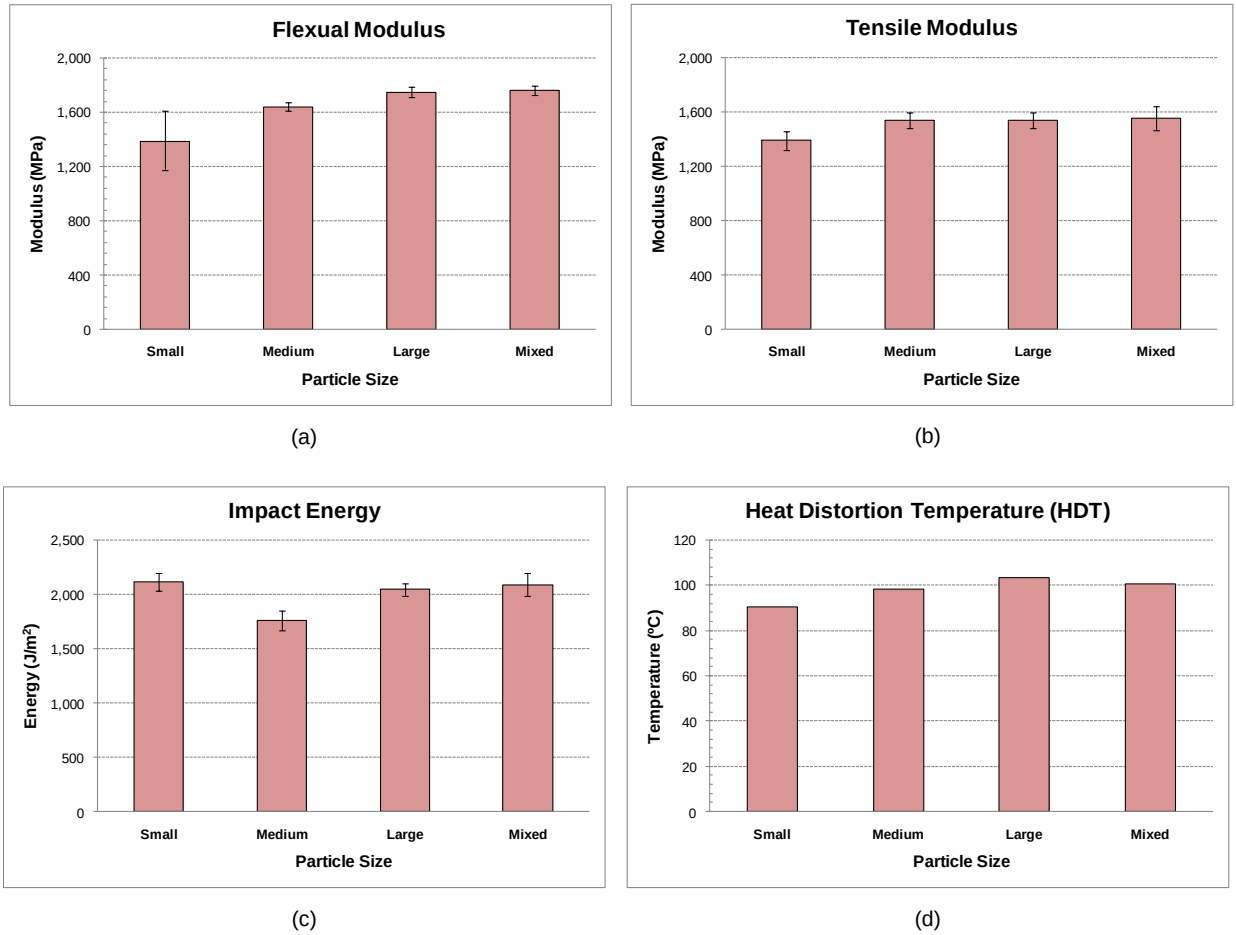

Figure 9. Mechanical properties of WPCs prepared with 50 wt% wood and 2.5 wt% coupling agent as a function of particle size. (a) Flexural modulus (b) Tensile modulus (c) Energy required to break of the samples (d) Heat Distortion Temperature (HDT). All samples were prepared with PP matrix.

Conclusions

Composition in wood plastic composites (WPC) such as wood flour content, coupling agent loading, size of particle, and polymer matrix all impact mechanical properties of wood plastic composite. Increasing wood content resulted in higher stiffness and heat distortion temperature (HDT) because the wood has higher modulus than the plastic. On the other hand, increasing wood content exhibits lower strength and strain due to poor interfacial adhesion between wood and plastic so the coupling agent is required in order to improve the compatibility between wood and plastic. The results of WPC with added coupling agent are higher in strength and stiffness. Using 5-wt% coupling agent exhibited maximum mechanical properties of WPC. Higher amount of wood also reduced energy to break of WPC because wood acted as stress concentrator so it made cracks initiate easier. Polymer matrix also showed significant effects to properties of WPC. Using polypropylene (PP) based matrix resulted in higher strength and modulus but lower impact strength than polyethylene (HDPE) because PP is stronger and stiffer but more brittle than HDPE. For the effect of particle size, small size of wood

resulted in higher strength because it created fewer defects or less void compared to larger size.

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