

## Study on the property of microcellular injection molded HDPE/wheat straw composites

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**Abstract:** This study investigated the effect of wheat straw loading and wheat straw sizes on the property of the microcellular injection molded HDPE/wheat straw composites. Experimental results showed that the tensile strength of foamed materials will be improved with the increase of wheat straw percentage and the decrease of wheat straw size.

**Keywords:** Wheat straw, HDPE, composites, microcellular injection

### 1. Introduction

In order to reduce the waste by human being, recycled materials are considered to save energy. Hence, wood plastic composites (WPC) reinforced polymer with natural fiber such as wood, wheat straw and sunflower stalk have become popular due to not only their environmentally friendly and renewable [1], but also there are superior to neat plastics in terms of material costs [2]. In this study, effects of wheat straw loading and wheat straw size on the properties of microcellular injection molded composites are studied. The experimental setup is as shown in Figure 1. Wheat straw loading is from 0, 5, and 10 wt% and wheat straw sizes is from 40-60, 60-80, and >80 mesh.



Fig. 1. The flow chart of microcellular injection molding process.

### 2. Results and Discussion

Figure 2a and 2b show the tensile strength comparisons of different wheat straw loading and straw sizes respectively. The increase of wheat straw content and the decrease of wheat straw size increases the tensile strength. The tensile strength of foamed parts with 0, 5, and 10 wt% wheat straw is 13.86, 14.99, and 15.85 MPa, respectively. The tensile strength of foamed parts for the size of wheat straw 40-60, 60-80, and >80 mesh is 13.86, 14.99, and 15.85 MPa, respectively. The tensile strength of foamed composites with 10 wt% wheat straw increases by 14.36% compared to that of neat PP. The tensile strength of foamed composites with >80 mesh wheat straw increases by 7.40% compared to that with 40-60 mesh wheat straw. As a wood fiber, wheat straw has high strength and rigidity, and the low content of wheat straw can be evenly dispersed in the matrix material grafted with maleic anhydride.

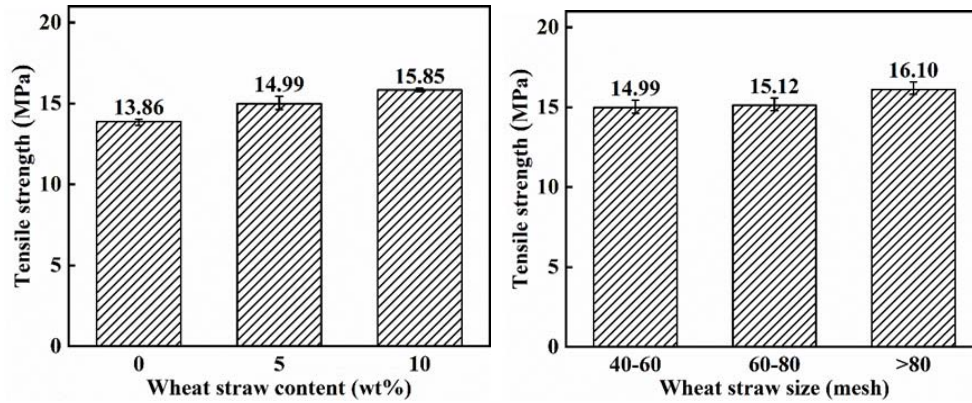


Figure 2 Tensile strength of (a) different wheat straw contents and (b) different wheat straw sizes.

### 3. Concluding Remarks

In this study, foamed HDPE/wheat straw composites samples were prepared by foaming injection molding and the effects of wheat straw content and wheat straw size on the mechanical properties of the foamed HDPE/wheat straw composites were investigated. It was observed that the increase of wheat straw content and the decrease of wheat straw size results in an increase in tensile strength of foamed HDPE/wheat straw composites.

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### References

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