

Development of New Bio-based Molded Products using Citric Acid.

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This study aims to develop a wood molded product using wood powder (*Acacia mangium*) and citric acid as a natural binder and to investigate its physical and mechanical properties.

The wood and citric acid powders were used as raw materials. The size of the wood powder was 60mesh pass (less than 250 μ m). The citric acid powder was mixed with the wood powder uniformly with the ratio of 0-40 wt%. The mixture was put into a mold and hot-pressed at 140~220 $^{\circ}$ C with a pressure of 1~8MPa for 1~15min. The dark brown molded products were obtained as shown in Photo1. The densities of the products ranged from 0.9 to 1.3 g/cm³. Three-point bending, water absorption, repeated boiling tests were performed to evaluate physical and mechanical properties of the molded products.

Figure 1 shows the bending properties of molded products. In the case of wood powder only, the bending properties of molded products were hardly indicated. The properties were improved with addition of citric acid, and the modulus of rupture (MOR) of 20wt% citric acid content reached a maximum value of 36MPa. The MOR value of molded products pressed at 180 $^{\circ}$ C had about 39MPa. The molded products with citric acid did not decomposed even when a repeated boiling treatment. It was clarified that citric acid acted as a bio-adhesive.

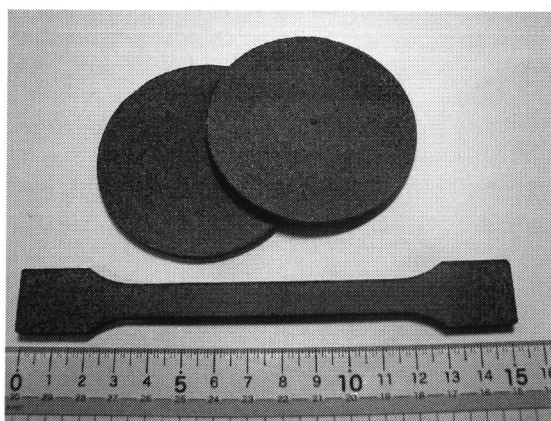


Photo1. The molded product consisting of wood and citric acid.

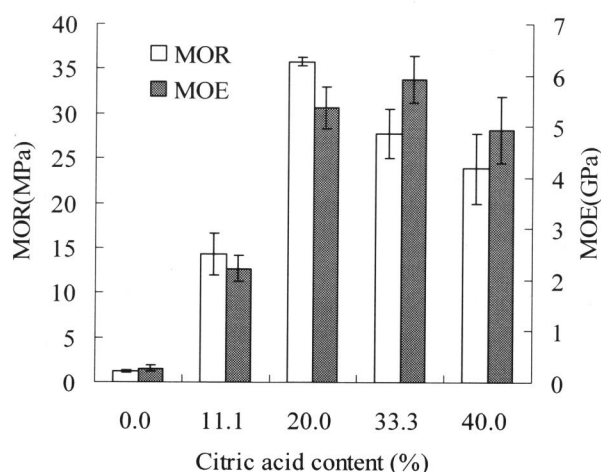


Figure1. Effects of CA content on the mechanical properties of molded product pressed at 200 $^{\circ}$ C, 4MPa, for 10min.