

ABSTRACTS (MASTER THESIS)

Development of Plywood Bonded with Citric Acid.

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Introduction

Recently, various kinds of synthetic resins derived from fossil resources are used as adhesives in the wood industry. However, fossil resources are not renewable and are being steadily exhausted. Furthermore, synthetic resins are not good for environment and human health. The development of the alternative adhesives made from non-fossil resources is required. In this study, plywoods using citric acid as a natural adhesive were made, and physical properties were investigated.

Materials and Methods

Japanese cedar veneer and citric acid were used in this research. The veneer (300mm×300mm×3mm) was rotary-cut veneer of sapwood made of Japanese cedar (MC=8~11%). Citric acid as adhesive was pulverized into powder (less than 250 μm). Saccharides and lignocellulose powders with the same size were used as additives. The powder was sprinkled on veneer surface, and 3-ply plywood was manufactured. The condition of citric acid content, press temperature, time, and pressure were adjusted to 20~200g/m², 180 to 240°C, 3 to 15 minutes, and 1MPa respectively. According to Japanese Agricultural Standard, dry bond strength test and repeated boiling test were performed to evaluate mechanical properties of plywood.

Results and discussion

Fig.1 shows the relationship between press temperature and bond strength of plywood. In the case of 180°C, the dry bond strength was low, and the wet bond strength was not obtained due to decomposition during treatment. However, the bond strength increased with increasing press temperature. When press temperature was 220°C, the bond strengths were 0.93MPa (Dry) and 0.57MPa (Wet). In case of at 240°C, the bond strengths were similar to those of at 220°C. This indicated that the press temperature of 220°C is needed to get good bond strength.

Considering the results of other experiments, the suitable manufacture condition of plywood using citric acid was 220°C, 10 minute, 60g/m².

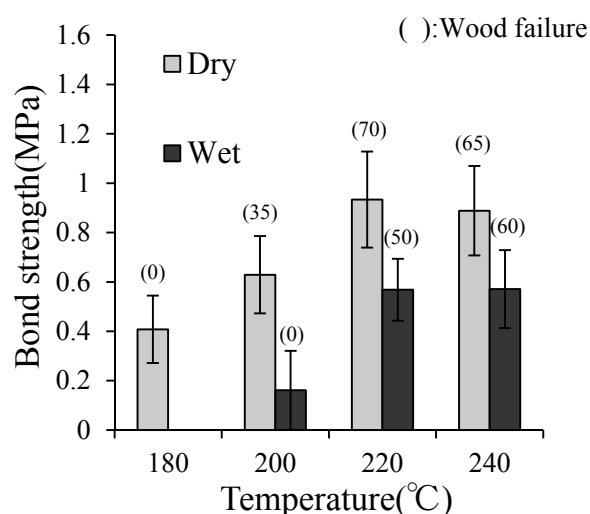


Fig1. Effect of press temperature on bond strength at 60g/m², 1MPa for 10 minutes.