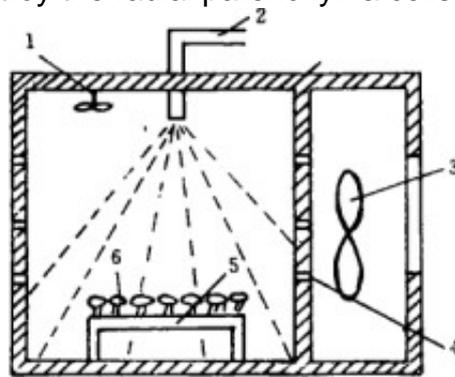


Application of wood microwave modification technology

Wood microwave modification technology is to use a certain frequency of microwave partial or total treatment of wood, wood cell wall destroy the weak links of the pore membrane, improve the permeability, so as to dye, impregnate and other treatment. Through modification technology, bamboo wood can be endowed with some special functions, making low-grade bamboo wood high-grade, thus effectively utilizing bamboo wood, and improving economic value.

The permeability of low density wood was improved most obviously by [microwave drying equipment](#), which laid a certain foundation for efficient utilization of plantation wood. Microwave irradiation was used to treat larch wood specimens with different power. It was found that microwave irradiation could destroy the radial parenchyma cells of larch wood and produce



microcracks at the same time.

Microwave radiation can soften the wood and bend it into different radius of curvature in a very short time. The bending properties of poplar, maple tree, *Taxodium ascendens* and *Paulownia* wood were studied by microwave heating. The results showed that the elastic modulus of poplar and maple tree decreased after microwave treatment, which was helpful for wood bending. Li Jun studied the relationship between bending parameters and product quality of *Fraxinus mandshurica* specimen heated by microwave. The optimum bending parameters were 60% moisture content of wood, 400 W microwave power and 2-5 min heating time.

After microwave drying, the inside and outside color of wood is more uniform and wood utilization value is higher. The dyeing method of wood pretreated by microwave was studied, which has the advantages of small equipment investment, simple process and good treatment effect.

The flame retardant agent is injected into wood by microwave treatment, so the flame retardant agent is not easy to lose and the flame retardant effect is more obvious. The application of microwave treatment technology in fire retardant treatment of *Pinus sylvestris* var. *mongolica* and *Fraxinus mandshurica* wood was studied. The results showed that the flame retardant effect of microwave treatment was better than that of conventional treatment.

The [microwave drying of wood](#) can increase the density and strength of wood by impregnating chemical substances into wood. The Cyanoethylation modification technology of Chinese fir

under microwave irradiation was studied by Wan Dongbei et al. It was found that the weight gain of Chinese fir could be the same as that of traditional isothermal water bath reaction for 240 minutes by microwave irradiation for 20 minutes.

Cyanide ethyl wood. Benzylolation modification of Chinese fir was studied by microwave irradiation. The weight gain of Chinese fir treated by microwave irradiation for 100 min was basically the same as that by conventional heating method, but the reaction time was shortened by 58%.

Application of 2 Microwave Technology in adhesive synthesis

The adhesive was synthesized by microwave irradiation. The reaction rate was tens of times faster than that by traditional heating method. It was characterized by simple operation, high yield, safety and hygiene. Xu Heng and others used phenol and formaldehyde as raw materials to synthesize phenolic resin by microwave heating under alkaline conditions. Glucose-phenol resin adhesive was synthesized by microwave heating under alkaline condition with glucose instead of formaldehyde. He Chengdong and others synthesized urea-formaldehyde resin by microwave heating under weak alkaline condition with urea and formaldehyde as raw materials.

Application of 3 Microwave Technology in product quality testing

3.1 material defect detection

Multilayer plywood and veneer laminated lumber usually have porosity, porosity, resin cracking, delamination, debonding and other defects, wood usually has knots, cracks, scars and other defects, the position and size of these defects in the material can be assessed by microwave testing technology. Microwave reflects, scatters and transmits at the discontinuous interface of bamboo and wood, and interacts with the tested material. The microwave field is affected by the electromagnetic and geometric parameters of the material. The defects of bamboo and wood can be detected by changing the basic parameters of microwave signal.

M. Rockwitz and others put forward the defect detection theory of composite materials, the formula is Ka_1 , which calculates the defect size according to the radius of air gap and microwave power. Deng Zhigang and other researchers have studied the microwave detection technology of plate defects. The plate defects are detected by microwave sensors. The signals are input into the computer through laser positioner. The number, size and position of knots are clearly displayed on the computer. The maximum detection thickness of cork and hardwood are 65mm and 50mm respectively.

3.2 moisture content detection of bamboo and wood products

Microwave detection of moisture content has two ways: heating and drying and measuring dielectric permittivity. Its greatest advantage is that it is fast, suitable for rapid determination of moisture content and on-line measurement. It is of great significance to the determination and control of moisture in the production process. A method of microwave oven oven test (WB-HX) for determining moisture content of pine wood in southern China is presented. The total determination time of this method is 4 ~ 6 hours, which is about 7 hours less than that of the conventional oven drying method, and the detection cost is about 50%. Microwave technology is applied to study the on-line moisture content measurement system of veneer. The system can measure the moisture content by measuring the dielectric constant of water. It has the advantages of convenient use, high speed and high precision.

3.3 formaldehyde emission from wood-based panels

Microwave-assisted extraction of formaldehyde from wood-based panels is a method which uses microwave energy to enhance the volatilization rate of free formaldehyde, that is, to accelerate the extraction process of free formaldehyde from wood-based panels by microwave heating. Compared with the conventional perforated extraction method of formaldehyde emission, microwave extraction without toluene has the advantages of high speed, high efficiency and no pollution. Extraction of formaldehyde from wood-based panels by microwave was carried out with water as extraction solution. The extraction time was less than 3 min. The microwave extraction method of formaldehyde emission from MDF was studied, and the correlation between microwave extraction method and perforation method was further analyzed.