

Formaldehyde-free Natural Adhesives for Wood-based Materials

Environmentally friendly Adhesive without Using Petroleum Resources

Inventor: Kenji Umemura, Research Institute of Sustainable Humanosphere, Kyoto University

Description

A researcher at Kyoto University has developed a formaldehyde-free natural wood adhesives using nature-identical ingredients.

Wood-based materials are considered to be sustainable materials, but adhesives derived from petroleum resources are inevitably used when manufacturing those. In addition, synthetic resin adhesives contain hazardous compounds such as formaldehyde that cause health disorders and environmental problems.

The innovation provides for a formaldehyde-free natural adhesive that is safe for human health and environment by simply using sucrose and phosphate compound. The water solution dissolving those compounds is able to be used as an adhesive directly. The inventor manufactured particleboard using the adhesive under the similar fabrication conditions as the conventional particleboards; 9 minutes hot pressing at 160C. The mechanical properties of particleboard fabricated were comparable to those of commercial particleboard.

Advantage

1. No requirement of hazardous additives
2. Board fabrication under the similar conditions as conventional fabrication (9 minutes hot pressing at 160C)
3. Good mechanical properties (MOR: 16.8N/mm²)

R&D Status

Basic properties of the particleboard prototype have been tested, including its bending strength (Fig. 1). Please ask for more details.

Market

We are seeking a wood adhesive manufacturer/ wood board manufacturer interested in the scale-up and the industrial application of the technology through licensing.

Intellectual Property

JP2013-XXXXXX (Pending)

Fig. 1 Comparison with Conventional Adhesives under a Laboratory Condition.

Adhesive Type	Main Component	Hot Pressing (9mm thickness)	Bending Strength
Urea Formaldehyde (UF)	<ul style="list-style-type: none"> • Urea • Formaldehyde 	<ul style="list-style-type: none"> • 140-160C • 9 minutes 	13.0N/mm ² or more
Melamine Formaldehyde (MF)	<ul style="list-style-type: none"> • Melamine • Formaldehyde 	<ul style="list-style-type: none"> • 140-160C • 9 minutes 	18.0N/mm ² or more
Phenol Formaldehyde (PF)	<ul style="list-style-type: none"> • Phenol • Formaldehyde 	<ul style="list-style-type: none"> • 160-170C • 9 minutes 	18.0N/mm ² or more
Innovation	<ul style="list-style-type: none"> • Sucrose • Phosphate compound 	<ul style="list-style-type: none"> • 160C • 9 minutes (Ongoing optimization) 	16.8N/mm ² (Ongoing Optimization)

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