

NOVEL BIO- BASED ADHESIVE FROM CROSS-LINKED RICE STARCH-NATURAL RUBBER LATEX (NRL) FOR WOOD BASED PANELS BONDING



Patent

- PI 2016400009

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PRODUCT BACKGROUND

- Synthetic adhesive plays an important role in determining the strength of the composite wood panels in the industry.
- International Agency for Cancer Research (IARC) has declared synthetic adhesive as a threat to human health and environment for emitting carcinogenic gas formaldehyde.
- The breakthroughs have encouraged researcher to look for a sustainable solution to formaldehyde threat that are derived from natural resources.
- Bio-adhesive from rice starch and natural rubber latex can open a novel awareness into the design of environment friendly and formaldehyde free composite wood.



NOVELTY

- Bio-based adhesive from natural substances such as natural Rubber Latex and starch.
- It is free of formaldehyde emissions and eco-friendly.
- It can be obtained at lower cost compared to industrial grade.

BENEFITS

- Performance benefits and new functionalities.
- Low cost raw material and low toxicity.
- Great potential to enter world market.

ENVIRONMENTAL IMPACT

- Low carbon footprint.
- low human toxicity.
- High biodegradability.



COST ANALYSIS

	Urea Formaldehyde (UF)	Bio-adhesive (Rice starch + Rubber latex)
Price / kg (RM)	4.70*	4.20**
Price of Adhesive / m ³ board	37.60	33.60
Price variation		10.6% cheaper

(*) Price listed is subject to change upon world market price and excluding transportation or shipping rate.

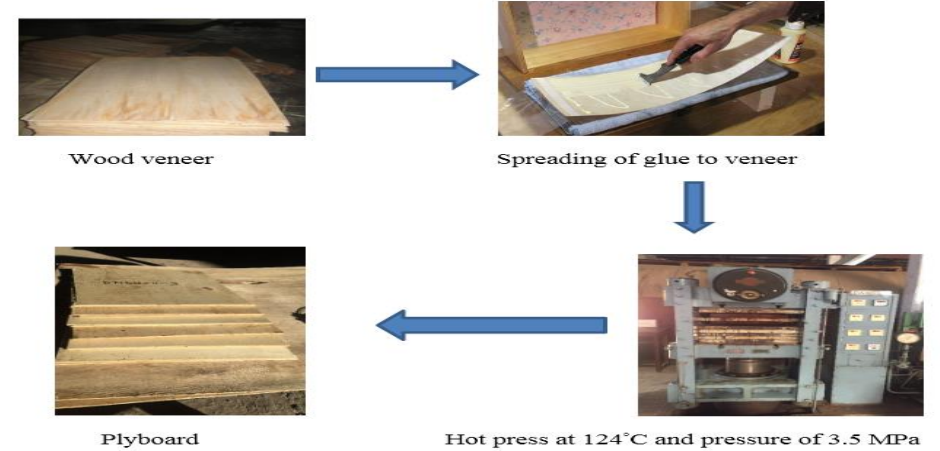
(**) Price is subject to change upon suppliers' rate.

COLLABORATION

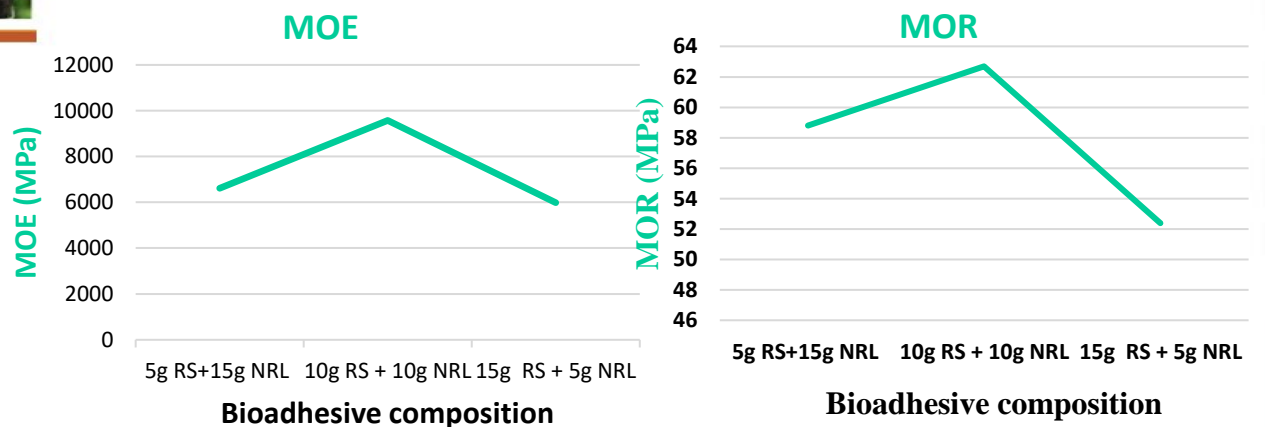
- MIECO Chipboard Sdn Bhd, Malaysia
- Robin Resources Sdn Bhd, Malaysia:

METHODOLOGY

Formulation of bio-adhesive	Wt. of NR latex (g)	Wt. of cross-linked rice starch (g)	pH	Temperature
A	5	15	11	90°C
B	10	10	11	90°C
C	15	5	11	90°C



RESULTS



MARKETABILITY & COMMERCIALIZATION

- Wood based panels and furniture industries.
- Food packaging, paper industry and construction.



PUBLICATION

- Natural Rubber Latex (NRL) and rice starch as an alternative binder in wood composite industry, 10(17):101-106 (2016).
- Synthesis and characterization of medium density fiber board by using mixture of natural rubber latex and starch as an adhesive (2014). DOI: [10.1007/s13196-014-0124-0](https://doi.org/10.1007/s13196-014-0124-0)
- Novel natural rubber latex/lignin-based bio-adhesive: synthesis and its application on medium density fiber-board, 28: 283–290(2019).