



Research

Ir. Ts. Dr. Juliawati produces microcapsules composed of honey and linseed oil to enhance metal corrosion resistance

7 December 2023

PEKAN, 20 September 2023 - The cost of repairing or maintaining automotive components, oil and gas pipelines, and the like is not cheap and requires suitable and effective methods to protect metals and materials from corrosion.

Addressing this challenge, Ir. Ts. Dr. Juliawati Alias, Head of Programme for Bachelor of Mechanical Engineering (Automotive) at Faculty of Mechanical and Automotive Engineering Technology (FTKMA), Universiti Malaysia Pahang Al-Sultan Abdullah (UMPSA), has developed microcapsules containing honey and linseed oil. These microcapsules act as corrosion inhibitors in paint, forming a smart coating.

According to her, the microcapsules are formed in a spherical shape with sizes ranging from 30 to 70 micrometres, depending on the agitation rate.

"These microcapsules will be added to the epoxy and hardener mixture in a suitable ratio or proportion.

"Smart coating functions as a self-healing mechanism, automatically releasing rust inhibitors when any scratches occur on the painted surface, thereby minimizing the risk of metal surfaces rusting.

"Based on corrosion tests conducted, it is evident that the corrosion rate of metal decreases by over 99 percent. The corrosion rate per year for untreated or coated metal is 23.1 mm/y, while for metal coated with smart coating, it is significantly lower at 0.001 mm/y," she explained.

This research, initiated in 2019 and funded by the KPT research grant, also involved collaboration with FTMKA lecturer, Dr. Nasrul Azuan Alang, and FTKMA master's student, Nurul Amiratul Johari. The project was completed in November 2022.

MICROENCAPSULATED HONEY FOR INTELLIGENT AND FUTURE PAINT



®ITEX.55

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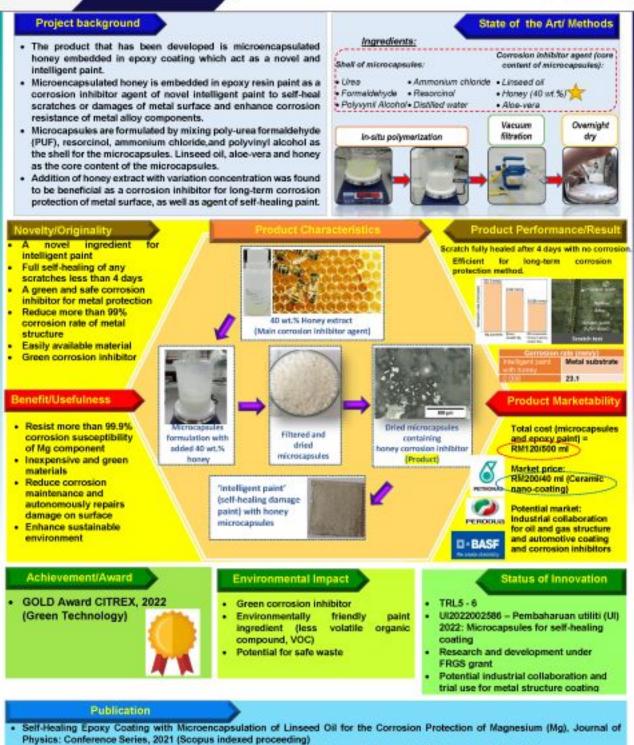
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> PATENT STATUS: U/2022002586





She added that the concept of creating a smart coating originated when she contemplated the appropriate and effective methods to protect metals and materials from corrosion.

Recent progress of self-healing coating, Journal of Coatings Technology and Research, 2022 (Scopus, WOS, Q2) Anti-corrosive coatings of magnesium: A review, Materials Today: Proceeding, 2021 (Scopus Indexed proceeding) "The latest research indicates that the application of smart coating is highly effective in protecting metal components, sparking my interest to further investigation and study.

"However, the extent to which the manufacturing process, characterization, and performance translate with the modification of these microcapsules by adding honey as a rust inhibitor has been detailed in the application for the KPT research grant titled 'Interaction Mechanism of Self-Healing Epoxy Coating and Microencapsulated Inhibitor for Corrosion Protection of Magnesium Alloys," she said.

This product functions to enhance the long-term corrosion protection of metal or metal components and is available at a price of RM50 for 50 ml.

In the future, the product will be tested in real applications such as painting cars, pipes, or iron components.

The product has also won a gold medal at the Creative and Innovative Invention Competition (CITREX) 2022.

Additionally, it secured a silver medal at the International Invention, Innovation, and Technology Exhibition (ITEX) 2022 and CITREX 2021.

Apart from the microcapsules composed of honey and linseed oil, Ir. Ts. Dr. Juliawati has previously developed a motorbike roof shield and a corrosion test rig platform.

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