UNIVERSITI TEKNOLOGI MARA

PALM OIL WAX IN MODIFIED PICKERING EMULSION FOR SYNTHESIZING JANUS PARTICLES

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Dissertation submitted in partial fulfillment
of the requirements for the degree of
Master of Science

Faculty of Chemical Engineering

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AUTHOR'S DECLARATION

I declare that the work in this dissertation was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the result of my own work, unless otherwise indicated or acknowledged as referenced work. This topic has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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ABSTRACT

Janus Particles are non-homogeneous particles composing different functionalities on a single particle. Its unique ability to display diverse properties has attracted various fields of application. Despite the many methods available, synthesis of Janus particles especially in large amount has been a major challenge. One prominent method is via the Pickering emulsion route by employing paraffin wax as the particle immobilizer and to produce the emulsion. However, the preparation of Pickering emulsion is a challenge due to its complex thermodynamics control. In this study, a modified Pickering emulsion route to produce Janus particles using Palm Oil Wax to substitute paraffin wax was investigated. The Janus particles were fabricated from silica nanoparticles of the size 20 – 60 nm and functionalization of the silica particles were carried out using aminopropyl triethoxysilane. The introduced modified Pickering emulsion route used chloroform as a solvent to dissolve the wax instead of the standard heating step for the molten wax preparation. Furthermore the effect of chloroform and silica nanoparticles quantities on the emulsion and resulted Janus particles were investigated. Conducted SEM images on the prepared samples shows that the amount of chloroform and silica nanoparticles influences the quality of the produced Janus particles. The optimized condition was ascertained to be at chloroform to water ratio of 2:8 and silica nanoparticles percentage of 9%. Zeta potential (ZP) analysis on the functionalized silica particles showed the functionalized samples had ZP measurement of less than 15 mV whereas unmodified silica particles had ZP of 30 mV. This verified the success on the Janus particles synthesis because the difference in ZP measurement is attributed by the modified physical character of the functionalized silica particles producing anisotropic colloidal particles.

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