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24th **World Congress on**

Nanomaterials and Nanotechnology

July 12-13, 2018   Bangkok, Thailand

Preparation of functionalized low molecular-weight natural rubber latex by photochemical degradation using TiO$_2$ film coated on glass bead as a photocatalyst

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Natural Rubber (NR), derived from *Hevea brasiliensis*, has attracted a lot of attention due to its high Molecular-Weight (MW) and good mechanical properties. However, there are some limits of usage because it has no reactive terminal group leading to its low compatibility with other functional groups or additives. Recently, chemical modification was interested to modify and improve these lacks, for example, reducing the MW and introducing some functional groups resulting in the functionalized low MW NR (FLNR). The photochemical degradation process, the technique used to prepare the functionalized low MW NR (FLNR), looks more promising method due to the cleanliness, low energy/cost consumptions. In this work, FLNR was prepared in the presence of H$_2$O$_2$ in latex state and using TiO$_2$ film coated on Hollow Glass Bead (TiO$_2$-HGB) as a photo catalyst. The reaction was carried out under 1 kW of ultraviolet-A (UVA, λ_{max} 365 nm) irradiation. The successful coating of TiO$_2$ film on HGB was confirmed by Scanning Electron Microscopy fitted with element analysis accessory (SEM/EDX) and X-ray Diffraction Technique (XRD). In case of FLNR preparation, deproteinized natural rubber (DPNR) latex was used as a starting material. From the structural analysis, the obtained FLNR indicated the presence of hydroxyl, carbonyl and epoxide groups with no crosslinking reaction. The MW of FLNR reduced to around 0.34×10^5 g/mol. In addition, the TiO$_2$-HGB could be re-used up to 4 times without the damage of film.

Biography

Warissara Suttibut is currently pursuing her graduation from Department of Chemistry, Faculty of Science, Mahidol University, Thailand.

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