



SCHOLARLY PUBLICATIONS

School of Chemical Engineering

KIIT Deemed to be University

Journal Name: Journal of Colloid and Interface Science

IF: 9.7

Title: Electrostatic interactions reshape the internal architecture of ionic microgels

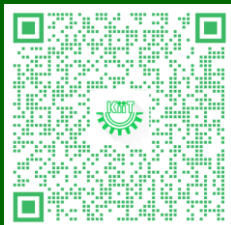
Author: Mohanty, PS; Zhang, C; Ballin, E; Brasili, F; Del Monte, G; Zaccarelli, E; Scheffold, F

Details: Volume 708, April 2026

Abstract: Incorporating ionic co-monomers into polymer microgels can alter their swelling behavior and introduce pH-responsiveness; however, their effect on the internal microgel structure remains poorly understood. Here we present a comprehensive study of poly(N-isopropylacrylamide-co-acrylic acid) microgels, revealing that the incorporation of ionic groups significantly alters their internal architecture. Using dynamic and static light scattering combined with small-angle X-ray scattering, we observe pronounced differences in form factors and swelling behavior between neutral and ionic microgels. These findings can be rationalized by monomer-resolved simulations, which reproduce the experimental form factors only when charge-induced alterations to the network architecture are explicitly accounted for during *in silico* synthesis. Our results demonstrate that electrostatic interactions modulate not only the swelling behavior but also the internal monomer density profile, highlighting the need to integrate and extend current modeling approaches for charged microgels.



URL: <https://www.sciencedirect.com/science/article/pii/S0021979725030966?>





SCHOLARLY PUBLICATIONS

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Journal Name: Biomass and Bioenergy

IF: 5.8

Title: Superheated non-catalytic transesterification of binary mixture of Madhuca indica and waste cooking oil towards biodiesel synthesis

Author: Karmakar, B.; Chatterjee, R.P.; Rhithuparna, D.; Chakraborty, S.; Khan, R.I.A.; Halder, G.

Details: Volume 220, July 2026

Abstract: Catalysed biodiesel synthesis requires an extended duration and produces large amounts of wastewater while incurring significant catalyst costs. In contrast, the uncatalysed conversion of suitable feedstock using superheated alcohols can provide sufficient energy, which means activation energy no longer affects reactivity. This eliminates catalyst requirement in addition to drastically reducing reaction time, as well as simplifying product separation and recovery of alcohols or by-products. The current study reports on uncatalysed alcoholysis of a binary blend made from mahua oil (MI) and waste cooking oil (WCO) to synthesize biodiesel using superheated blends of methanol and 2-propanol. Batch experiments identified ranges for six parameters suitable for soft-computational optimization and these parameters were then optimized via central composite design (CCD). A biodiesel yield of 98.9 % (predicted yield of 99.03 %) could be attained by reacting 600 g of WCO-MI oil blend in a 3:1 ratio using methanol and 2-propanol in a 6:5 ratio after preheating the alcohol mixture to 135 °C. The reaction proceeded optimally at 250 °C, taking 8 min retention time to be completed. Experimental results were analysed for reliability using ANOVA study, and data validation was carried out using artificial neural network (ANN). From ANOVA studies, it is seen that retention time has the most prominent impact on the process with a contribution factor of 48.82 %, while methanol to 2-propanol ratio has the lowest contribution factor of 0.25 %. The ANN model established adopting a 6-10-1 algorithm showed an R^2 value of 0.987, thereby reaching great accuracy which confirms its competence for reliable predictions.



URL: <https://www.sciencedirect.com/science/article/abs/pii/S0961953426001005>





SCHOLARLY PUBLICATIONS

School of Chemical Engineering

KIIT Deemed to be University

Journal Name: Polymer Engineering and Science

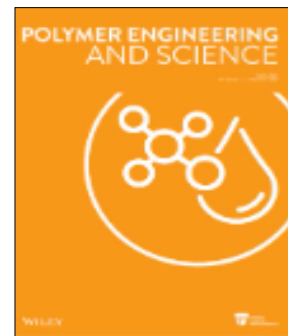
IF: 3.2

Title: Fuller's Earth Clay—Naturally Abundant, Environmentally Benign and a Low Cost Nano-Rod Shaped Clay Explored as a Potential Reinforcing Filler for Natural Rubber Latex

Author: Panigrahi H.; Aich N.; Kumari A.; Kumar B.; Kumar R.; Kotnees D.K.

Details: March 2026

Abstract: The use of naturally abundant and unmodified Fuller's Earth (FE) nanoclay as a reinforcing nanofiller in prevulcanized natural rubber (PVNR) latex is explored in this work. Initially, the FE nanoclay has been extensively characterized for its chemical composition, structural, and morphological characteristics. PVNR/FE nanoclay composites with varying amounts of FE nanoclay have been prepared by a simple water-based solution-mixing method. Morphological analysis and structural analysis of the PVNR/FE nanoclay composites have been carried out to assess the dispersion and distribution of FE nanoclay in the PVNR matrix. A notable increment in the mechanical properties has been observed up to a certain loading of FE nanoclay, which corroborates its reinforcing effect in the PVNR matrix. Nevertheless, at higher concentrations of FE nanoclay, the rod-shaped FE nanoclay particles start to aggregate in the PVNR matrix and consequently, the overall mechanical properties of the PVNR/FE nanoclay composites start to decrease. An increment in the glass transition temperature (T_g) and the room temperature storage modulus (G') of PVNR has been observed with the incorporation of FE nanoclay, which is attributed to the enhanced interactions between the PVNR rubber chains and the FE nanoclay particles. The TGA studies confirm that the PVNR/FE nanoclay composites show a reasonable increase in the thermal stability with the increase in the concentration of the FE nanoclay. This study clearly justifies the possibility of using the abundantly available unmodified FE nanoclay as an eco-friendly and cost-effective potential alternative nanoclay to other expensive and/or environmentally hazardous unmodified/modified nanoclays.



URL: <https://4spepublications.onlinelibrary.wiley.com/doi/10.1002/pen.70428>

