

# Partial hydrophobication of cationic polymers and applications toward stabilizer of cosmetic raw powders in oil

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Series of polyethyleneimine (PEI)-fatty acid complex has attempted to be prepared in isopropyl myristate (IPM) using stearic acid, oleic acid and isostearic acid for their application as a dispersant for TiO<sub>2</sub>/IPM suspensions. While it was not possible to fabricate PEI-stearic acid complex those were soluble in IPM, PEI complex with oleic acid and isostearic acid has successfully dissolved in IPM when the content of fatty acids were larger than 40 mol% and 80 mol%, respectively, based on the number of ethyleneimine monomer units. FT-IR analysis of PEI-OA and PEI-ISA dissolved in IPM showed that the hydrogen bonded COOH groups originally found in the spectra of free fatty acid has disappeared and new peaks those attributes to carboxylates has generated, which confirms the complex formation between carboxyl group of fatty acid and amine group of PEI. PEI-OA and PEI-ISA, which fatty acid complex ratio was 80 mol% based on EI unit content, was used for further investigation as a dispersant for TiO<sub>2</sub>/IPM suspensions. It was interestingly found that while PEI-ISA effectively adsorbed on TiO<sub>2</sub> fine particles in IPM and reached to a saturated adsorption condition when the additive content was 2.4 mg/m<sup>2</sup>, the adsorbed content of PEI-OA has kept increasing as increasing their additive content under the tested condition (~3.0 mg/m<sup>2</sup>) which suggests multi-layer adsorption. In spite of different adsorption structures, the sedimentation test of TiO<sub>2</sub>/IPM diluted suspension showed that the addition of PEI-OA and PEI-ISA can improve their dispersion stability when additive content was larger than 2.4 mg/m<sup>2</sup> while the suspension without and less complex addition formed sedimentation rapidly due to aggregate formation. It was also found that the dispersion improvement by PEI-OA and PEI-ISA can achieved under dense suspension; the suspension kept flowing for 15 vol% and 20 vol% suspension with 2.4 mg/m<sup>2</sup> addition of PEI-ISA and PEI-OA, respectively, while non-treated TiO<sub>2</sub>/IPM suspension rapidly solidified at 15 vol%. It was revealed that the dispersant design through the complex formation between PEI and fatty acid is applicable to IPM solvent system and the destined complex efficiently improved the stability of TiO<sub>2</sub>/IPM suspensions.