

Development of natural dye/inorganic host composite materials for the use of cosmetics

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Because of their non-toxicity, naturally occurring dyes are potentially suitable for the use of cosmetics. However, their instability obstructs the wide use of the natural dyes as a colorant. This study was focused on the enhancement of the stability of the natural dye by making composite with inorganic host materials. Anthocyanin dye was successfully adsorbed on the HMS type mesoporous silicas containing small amount of aluminum. The adsorption of the anthocyanin was enhanced by modifying the silica surface to be hydrophobic. However, the improvement in the light fastness of the adsorbed anthocyanin was not observed in the complex with HMS. Annatto dye was rather hydrophobic dye, so that the adsorption on the clay interlayer was difficult. Modification of the montmorillonite (cation-exchangeable clay) with cationic surfactant made it possible for the annatto dye to be incorporated in the clay interlayer, because the interlayer space became hydrophobic by the surfactant. Anion-exchangeable hydrotalcite was also able to adsorb the annatto by modification with anionic surfactant. The durability against visible light irradiation was enhanced by the incorporation of the annatto dye into the clay interlayer modified with the proper surfactant. The main cause of the stability enhancement was suggested to be the hindrance of the incorporated dye from the external oxygen molecules.