

Latent Fingerprint Analysis using Bioconjugated Fluorescent Nanoparticle

Poorani T. R. ¹, Ramya M. ²

¹*Department of Chemical Engineering, Erode Sengunthar Engineering College, Perundurai, Erode, India*

²*Department of ECE, PSG Tech, Coimbatore, India*

Email: pooranirajendran1993@gmail.com

Abstract

Fingerprints are the direct unique patterns for identification of individuals. These fingerprint patterns of latent (not visible) nature are very challenging to investigators. Normal powder dusting methods have high background interference due to its chemical contamination. To enhance the contrast, sensitivity, selectivity, efficiency and to lower the background emission properties, fluorescent nanoparticles can be doped with bioconjugated adhesive polymers. These polymers can be favourable candidates for latent fingerprint detection. Europium has excellent physical and chemical properties. The narrow band emission of europium allows good filtering of undesired background interference. This rare earth metal nanoparticle when doped with bio-adhesive polymer forms a conjugate that would act as an excellent fluorescent material. In this work, the bio-adhesive polymer is extracted from marine mussel as mussel adhesive protein (MAP). This adhesive protein anchors itself to the solid support; it is highly stable and transparent. It can easily immobilize nanomaterials with its stable adsorption. This bioadhesive material has high adsorption with biomolecules which forms the fingerprint constituents (proteins, sweat glands, amino acids, carbonyl groups, etc.). The adsorption properties are characterized using Langmuir and freundlich models. Characterization studies are performed by XRD, SEM and FTIR. Photoluminescence activity is studied by photoluminescence spectroscopy. This study shows a pathway for improvement in latent fingerprint analysis through fluorescent nanoparticle doped bioadhesive polymer.