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Biomimetic Luminescent Textile Using Biobased Products

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Abstract : Various organisms involve bioluminescence for their particular biological function. The bio-based molecules responsible for bioluminescence vary from one species to another, research has been done to identify the chemistry and different mechanisms involved in light production in living organisms. The light emitting chemical systems such as firefly and bacterial luminous mostly involves enzyme-catalyzed reactions and is widely used for ATP measurement, bioluminescence imaging, environmental biosensors etc. Our strategy is to design bioluminescent textiles using such bioluminescent systems. Hence, a detailed literature work was carried out to study on how to mimic bioluminescence effect seen in nature. Reaction mechanisms in various bioluminescent living organisms were studied and the components or molecules responsible for luminescence were identified. However, the challenge is to obtain the same effect on textiles by immobilizing enzymes responsible for light creation. Another challenge is also to regenerate substrates involved in the reaction system to create a longer lasting illumination in bioluminescent textiles. Natural film-forming polymers were used to immobilize the reactive components including enzymes on textile materials to design a biomimetic luminescent textile.

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