Proposal

Nowadays, there is a rapid growth of the global population as well as industrialization this resulted in a concomitant increase in the large of organic pollutants (dyes) in the environment. There are numerous classes of dyes (acid dyes, base dyes, vat dyes, reactive dyes, and sulfur dyes) [1] these have a very negative effect on the natural elements on the earth such as the air and the water, which is carcinogenic to the ecosystem. So, there is a greater demand to decompose these organic pollutants and provide a clean and safe environment. There are various methods such as physical treatment, chemical treatment, and biological treatment to treat organic dyes. But these methods have disadvantages such as less efficiency and less durability Henceforth, photocatalysis has attracted worldwide due to its potential to solve the environmental problems and sustainable energy source because of its high efficiency, low cost, and long-term durability [1]. The semiconducting materials are mostly used in the dye degradation process. And some of the transition semiconducting materials that are used are TiO_2, SnO, ZnO, NiO, etc. Because these materials have high light absorption capacity, it has good charge transport property (i.e it has very high catalytic property) and it also has an extended life [2]. Also, these semiconducting materials have some of the extended properties like material water insolubilities availability, less toxicity, it has enhanced photocatalytic activity like resistive to the chemicals, and also it has high stability against the physical and chemical corrosion [3]. When this semiconducting photo-catalysts are used in the colloidal form it is intricate to separate the photo-catalysts form the pollution suspension. So, the semiconducting photo-catalytic material is coated in 1D, 2D nanostructured thin films for its reusability [2]. These thin films have high Photocatalytic activity uses photons as the catalyst to increase the rate of photoreaction. The photocatalyst is more effective for the decomposing of organic compounds, bacteria, and odors, etc. In the presence of light and water, the photocatalyst creates a strong oxidizing agent and electronic holes to breakdown the organic matter, similar to photosynthesis. Simultaneous oxidation and reduction reaction that happens in this process [4]. Also, photo-catalytic metal oxides have a high energy bandgap so that it's essential to absorb the light into the visible regions and that generates the charge carriers the electrons and the holes [5]. There are various methods for this deposition of the nano-structured photo-catalytic thin-films and few of them are sol-gel, spray pyrolysis, reactive evaporation, chemical vapor deposition, pulsated laser ablation, sputtering, and the anodic oxidation. These nano-structured thin-films have the enhanced properties of surface redox reactions and the charge transportation rate this can be achieved by the anodization technique. Because, this technique has the uniform deposition of an oxide layer, low cost, and easy to handle. This, anodization is an electrochemical process in which the reduction and the oxidation that takes place simultaneously between the electrodes [6]. Porous oxide nanostructured thin films are produced from this technique and these films increase the mobility of the free carriers by creating collision-free movement and so there is an enhanced redox process so that the degradation of dyes can be done in a faster rate. Whereas, it also the recycling property with an enhanced lifetime. The thin-films coated are undergone for the photocatalytic degradation process in the presence of the visible light and this used for the degradation of various organic dyes such as the Methyl blue, Methyl orange, Rubin dye, Congo red, Acid blue, Crystal violet, Malachite green, etc. And properties of the thin-films can be studied by various techniques in which structural studies used to analyze the surface of the material, morphological is used to analyze the surface morphology and the surface topology of the material. Also, the roughness of the material is studied which enhances the photo-catalytic property when it is high. The optical study tells about the transmittance, conductance, and the bandgap the material, and the electrical is done to know the mobility and carrier concentrations.

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