

**REVIEWER'S REPORT****Manuscript No.: IJAR- 57690****Title: Punica granatum Dye Based Photogalvanic Cell for Solar Energy Conversion and Electrical Storage Using Fructose and Tween 80.****Recommendation:****Accept**

Rating	Excel.	Good	Fair	Poor
Originality	Yes			
Techn. Quality		Yes		
Clarity	Yes			
Significance		Yes		

Reviewer Name: Dr. Ashish Yadav***Detailed Reviewer's Report*****Reviewer's Comment for Publication.**

Acceptance Comment are mentioned below suitable for the paper titled "Punica granatum Dye Based Photogalvanic Cell for Solar Energy Conversion and Electrical Storage Using Fructose and Tween 80"

Reviewer Comments: Accept**Reviewer Comments –****Introduction:**

The manuscript presents an innovative and environmentally relevant study on the development of a natural dye-based photogalvanic cell for solar energy conversion and storage. The introduction effectively highlights the growing demand for sustainable and low-cost renewable energy technologies. The selection of Punica granatum as a natural dye sensitizer is scientifically justified due to its eco-friendly and easily available characteristics. The study also establishes the importance of integrating energy conversion and storage within a single photogalvanic system. Overall, the introduction provides a clear research motivation and demonstrates the significance of the proposed work in the field of green energy technologies.

Literature Review:

The literature review adequately discusses previous developments in photogalvanic cells, natural dye sensitizers, and alternative solar energy conversion systems. The manuscript successfully explains the limitations of conventional synthetic dyes and emphasizes the advantages of bio-derived sensitizers in sustainable energy applications. The role of reductants such as fructose and surfactants like Tween 80 in enhancing photogalvanic performance is appropriately addressed. Existing research on efficiency

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improvement, storage capability, and electrochemical performance provides a strong theoretical background for the study. The review effectively identifies the research gap concerning natural dye-based photogalvanic systems with enhanced storage properties.

Solution Approach:

The experimental methodology adopted in the study is systematic and technically sound. The preparation of the photogalvanic cell using Punica granatum dye, fructose, Tween 80, and alkaline medium demonstrates a well-designed approach for simultaneous solar energy conversion and storage. The investigation of multiple operational parameters such as pH, concentration variations, electrode area, diffusion length, and light intensity reflects comprehensive optimization of the system. The methodology is clearly presented and appears reproducible for future experimental studies. The integration of naturally available materials with photogalvanic technology adds significant novelty and sustainability value to the research.

Results and Discussion:

The results clearly demonstrate the effective performance of the fabricated photogalvanic cell under artificial illumination. The reported open circuit voltage of 969 mV, short circuit current of 928 μA , and maximum power output of 119.52 μW indicate promising electrochemical behavior of the developed system. The conversion efficiency and fill factor values confirm the capability of the natural dye-based cell for practical low-power energy applications. Additionally, the half decay time of 165 minutes highlights the appreciable energy storage performance of the device. The discussion logically explains the influence of different experimental parameters on cell performance and supports the effectiveness of the proposed photogalvanic system.

Conclusion:

The conclusion effectively summarizes the major findings of the study and confirms the feasibility of using Punica granatum natural dye in photogalvanic energy devices. The manuscript demonstrates that environmentally sustainable and low-cost materials can successfully contribute to solar energy conversion and electrical storage applications. The observed improvements in electrical output and storage stability validate the potential of the proposed system for future renewable energy technologies. The study contributes valuable knowledge to the field of green electrochemical energy systems and opens opportunities for further optimization of natural dye-based photogalvanic cells. Overall, the manuscript represents a meaningful and innovative contribution to sustainable energy research.