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SiO_2/TiO_2 Nanolayer coated on Solar Box Type Cooker

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Abstract

Utilizing active SiO_2/TiO_2 nanoparticles, examination of a stepped solar box cooker (SSBC) was enhanced. To improve thermal performance, they were coated on a bar plate in various ratios ranging from 5% to 25%. SiO_2/TiO_2 nanolayer-coated bar plate performance employed in the SSBC was contrasted with different doping nanoparticle percentages for their solar thermal properties. as employed at respective rates of 5%, 10%, 15%, 20%, and 25%, the SiO_2/TiO_2 nanolayers covered by the SSBC are able to improve performance by approximately 31.77%, 37.69%, 49.21%, 36.99%, and 34.66% as compared to that of the single nanolayers (SiO_2, TiO_2) of conventional cookers.

Introduction

Bhavani et al [1] have analyzed the heat transfer performance solar cooker with fuzzy logic controller. Here using the fuzzy set of mathermatical representation explain the solar cooker fuzzy mode. [2] investigated the energy control analysis of solar cooker with fuzzy set. Authors estimated the heat transfer process of Al_2O_3 nanoparticle mixed with black paint as show 15.14% thermal act and 7.10% nanoparticle adeptness. [3] experimentally analyzed of solar cooker with coating of MoS_2–$Fe2O_3$– Cr_2O_3 nanomaterials. Due to the high surface and volume ratio of the nano composite material it achieve the bar plate temperature up to 163.74.[4] adoped a Laplacian method to analyze the solar cooker coated with 1 g of NiO_2 nanoparticles. Fuzzy algorithm & Laplacian approach made a the temperature component of the cooker parameters. The proposed cooker achived the Figure of Merit 1 (0.425) and Figure of Merit 2 (1.55).

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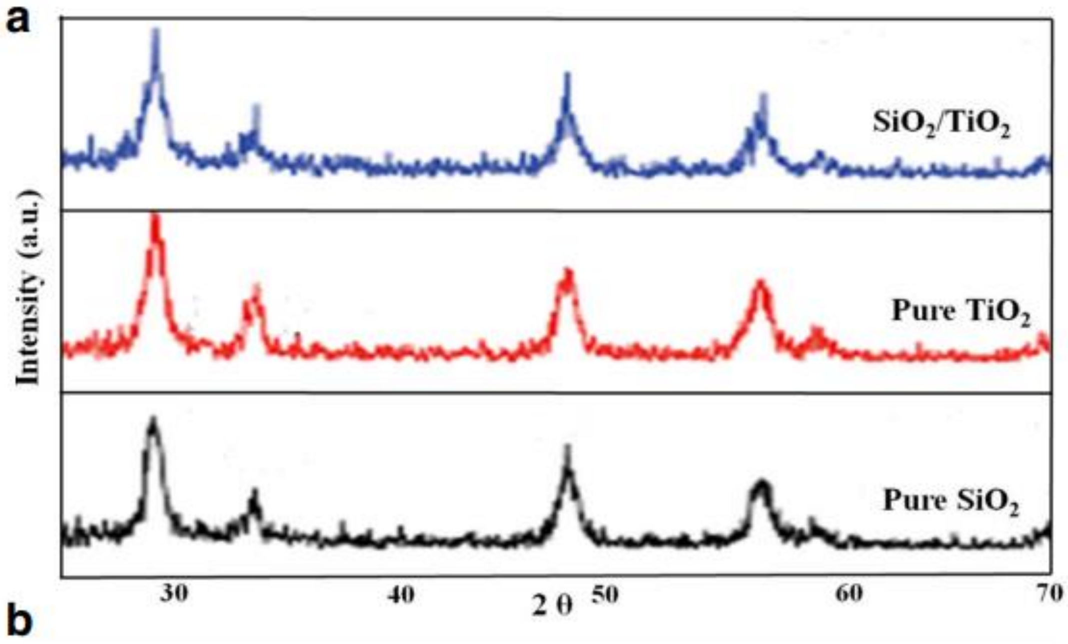

Fig 1 XRD Patten

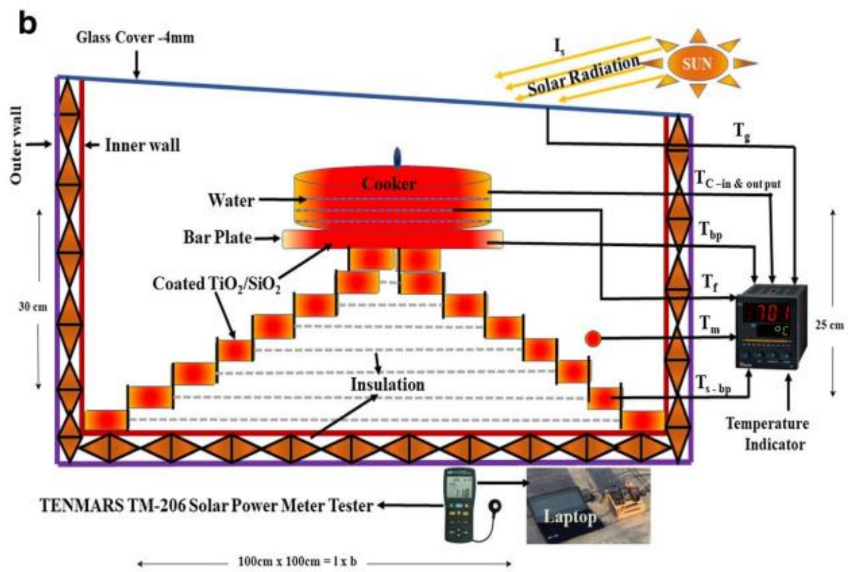

Fig 2. Schematic diagram

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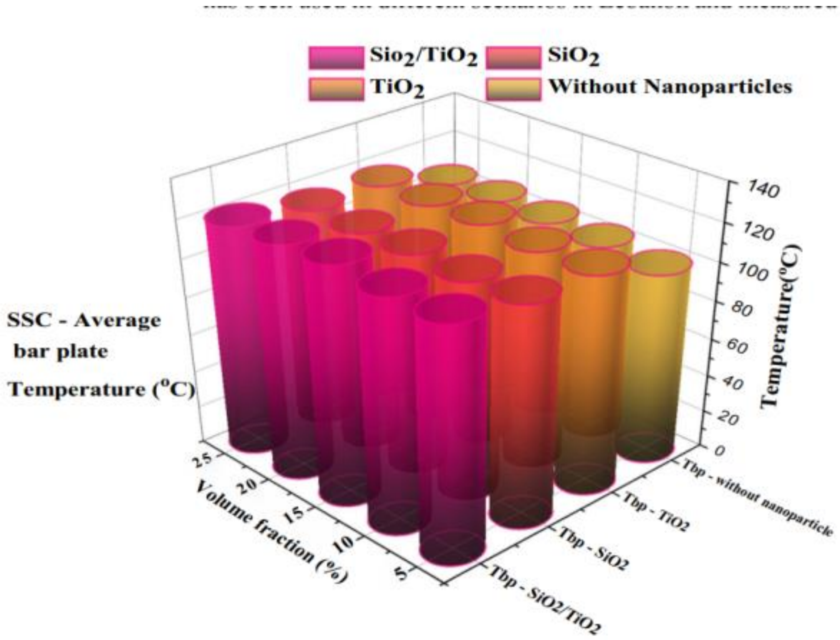

Fig 3 Bar plate temperature

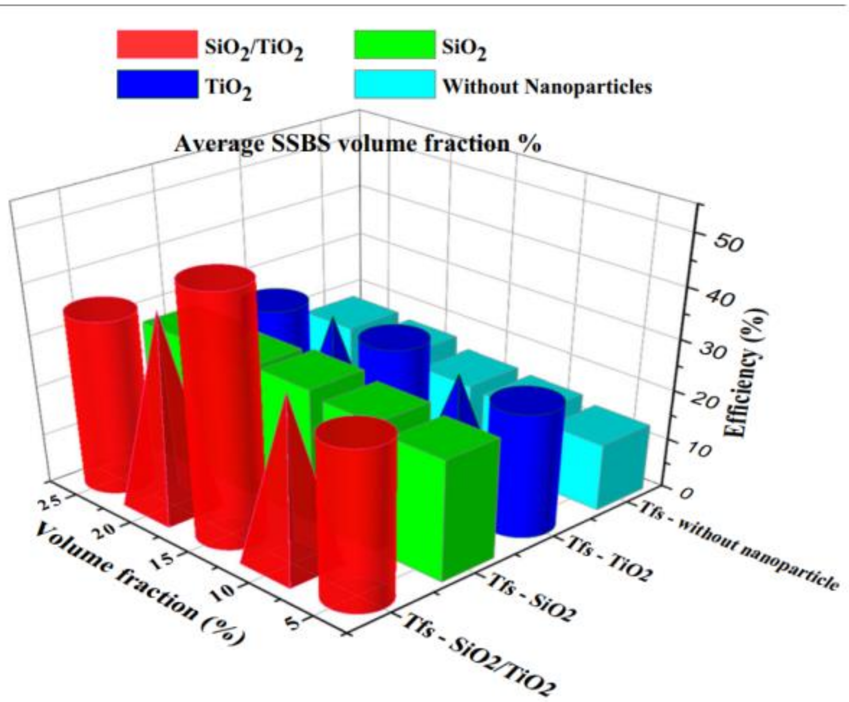

Fig 4 Efficiency analysis

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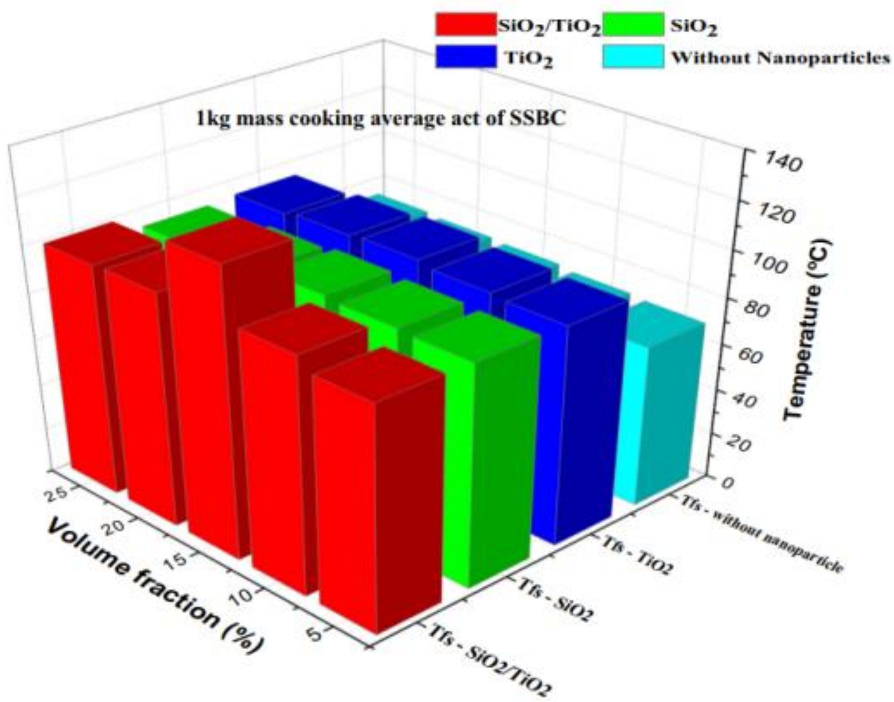

Fig 5 Cooking performance

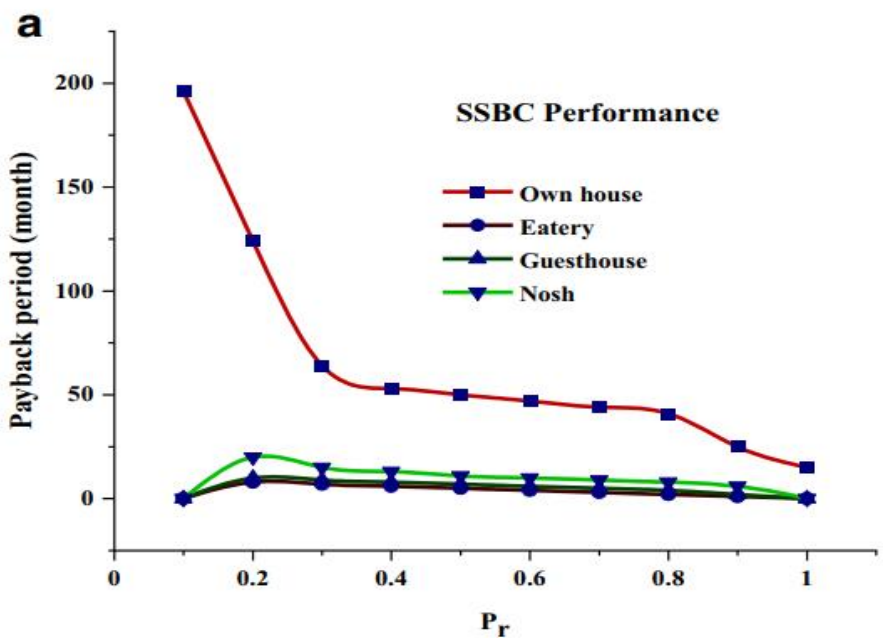

Fig 6. Payback period

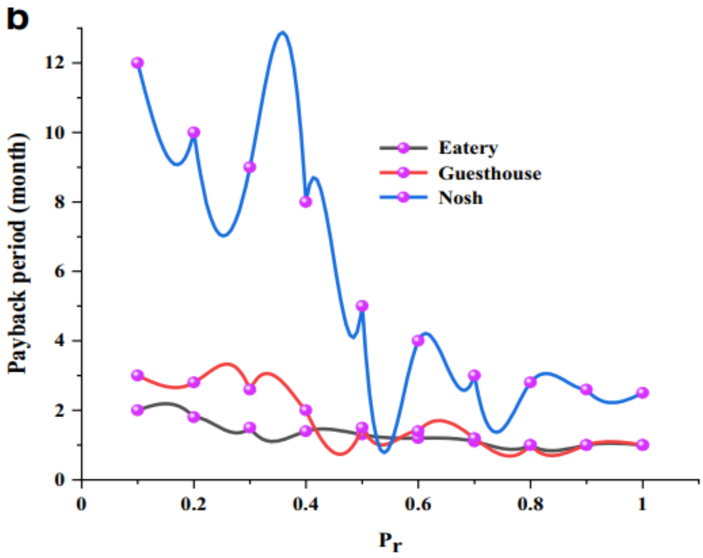

Fig 7. Payback period performance monthwise

Conclusion

Different fluid nanoparticle ratios were used in the studies on an SSBC. These ratios were covered over a bar plate to increase temperature and shorten cooking time. By employing around 15% SiO_2/TiO_2, the fluid nanoparticles were able to individually raise the average temperatures about 12.5%, 16.4%, 16.5%, and 16.3%. Results are significantly better than those of SSBC utilizing SiO_2 and TiO_2 phases without the presence of nanoparticles in the systems.

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