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Solar box cooker high energy adaptive control by OSELM

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Abstract

To address these issues, we have employed adaptive neural network-based control strategies that also take into account aspects including a smaller family, assessed conjunction, a lengthy feeding duration, and poor performance. This leads to the presentation and discussion of a revolutionary solar cooker that uses adaptive control using an online Sequential Extreme Learning Machine (OSELM). The efficiency of the cooker was improved by 37.69% and 49.21% utilizing 10% and 15% volume fractions of nanoparticles, respectively.

Introduction

Thamizharasu et al [1] verified the solar cooker performance with SiO_2/TiO_2 material with ratios of 5% to 25%. Compared to the single nanolayer coating in the conventional type cookers SiO_2/TiO_2 materials enhance the moist air temperature then achieved the thermal performance upto 49.21% (15%). Bhavani et al [2] 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. Bhavani et al [3] 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. Bhavani et al. [4] experimentally analyzed of solar cooker with coating of MoS2–Fe2O3– Cr2O3 nanomaterials. Due to the high surface and volume ratio of the nano composite material it achieve the bar plate temperature up to 163.74 °C.

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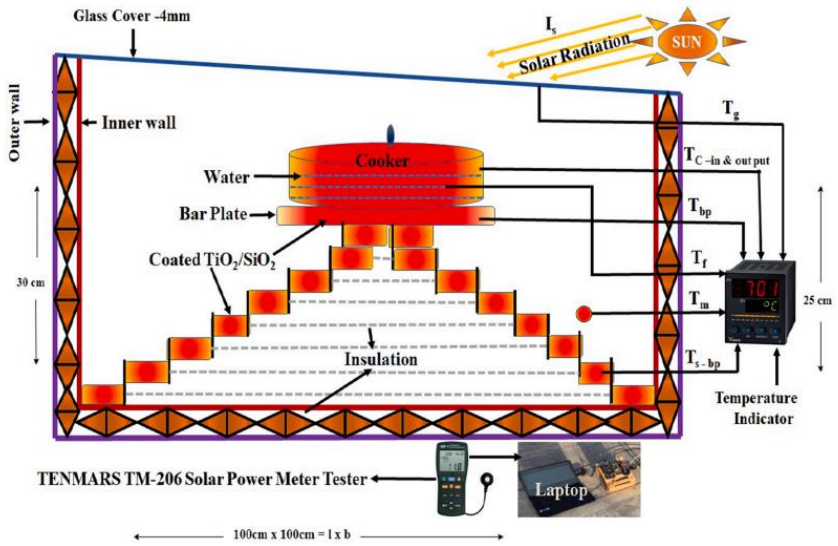

Fig. 1. Schematic diagrams

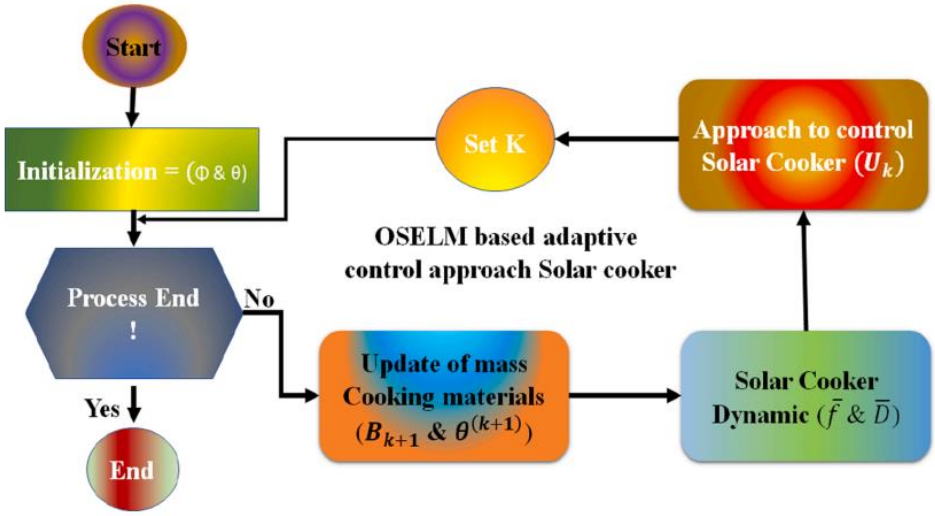

Fig. 2. Flow chart - solar cooker OSELM.

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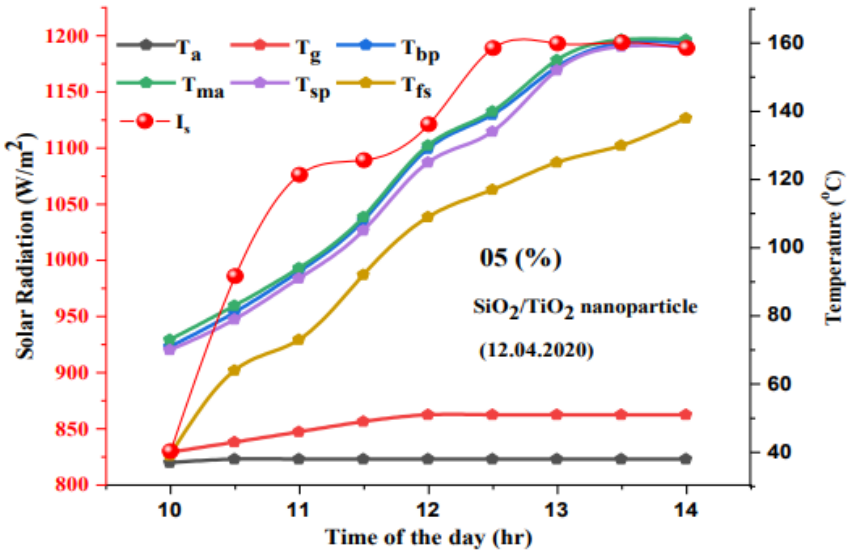

Fig. 3. 5% volume fractions - SSBC.

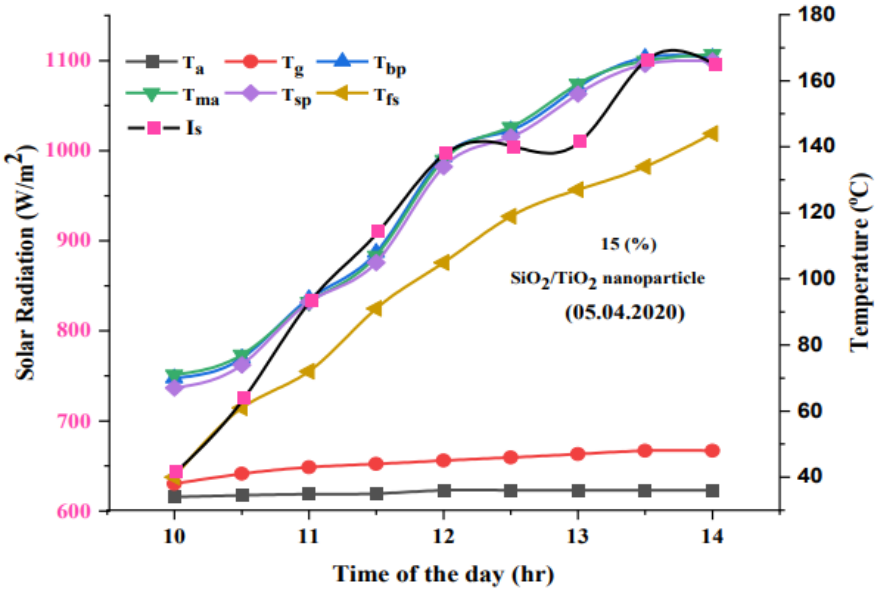

Fig. 4. 15% volume fractions - SSBC.

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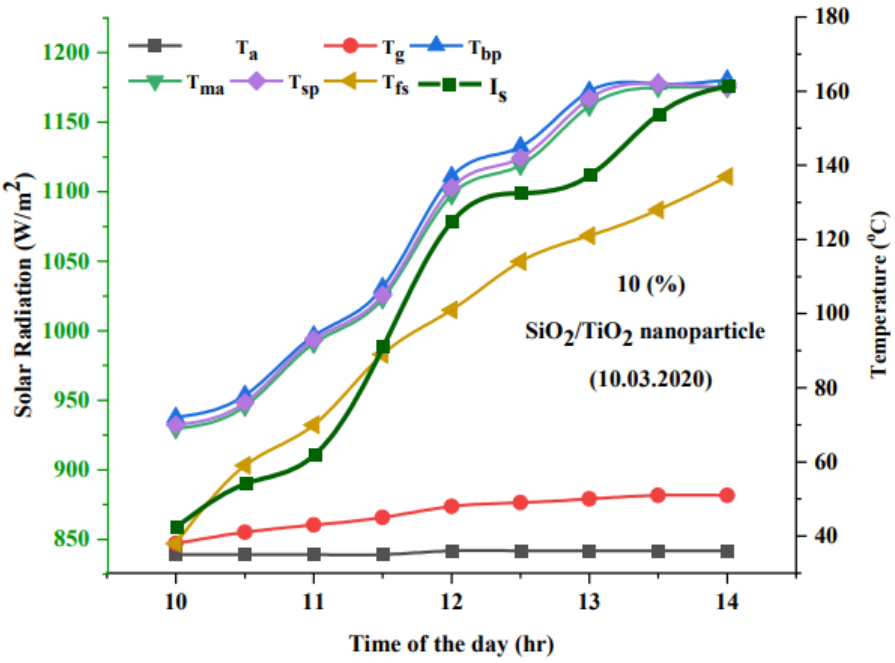

Fig. 5. 10% volume fractions - SSBC.

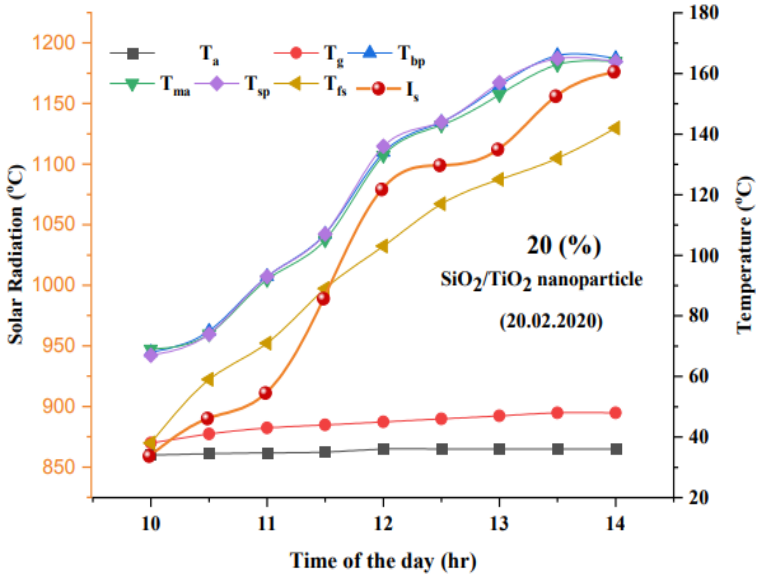

Fig. 6. 20% volume fractions - SSBC.

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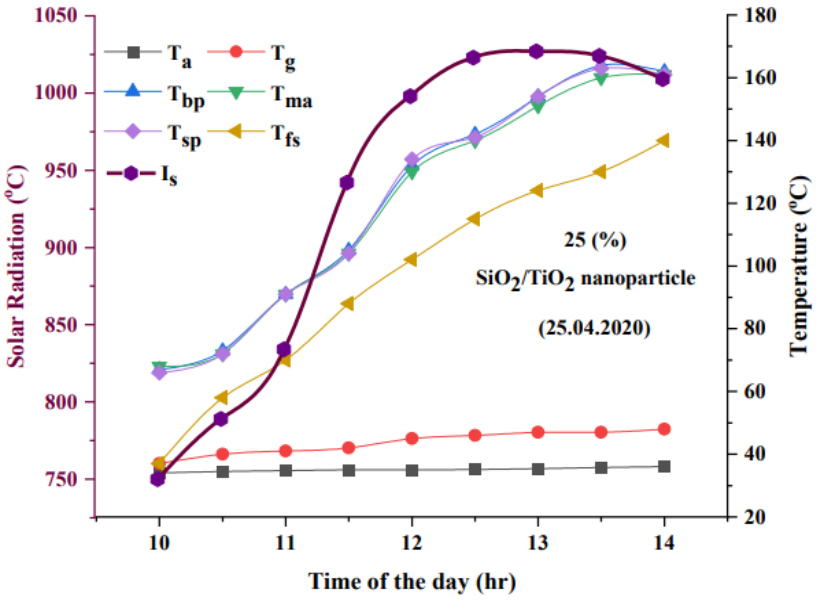

Fig. 7. sample analysis

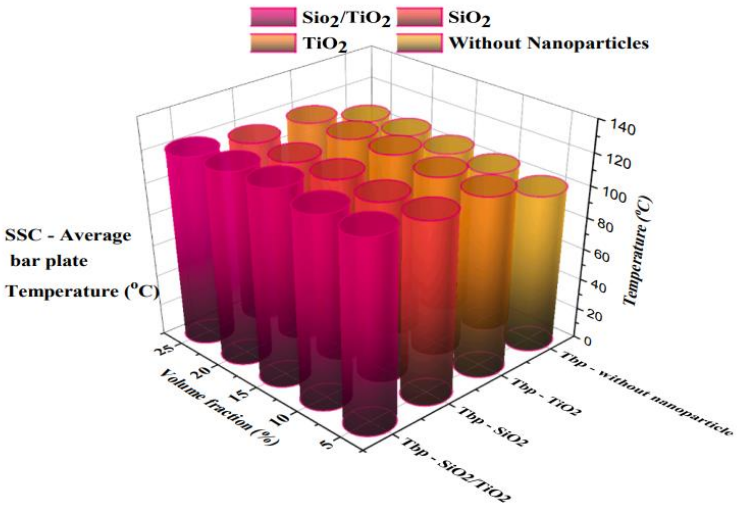

Fig. 8. bar plate temperature.

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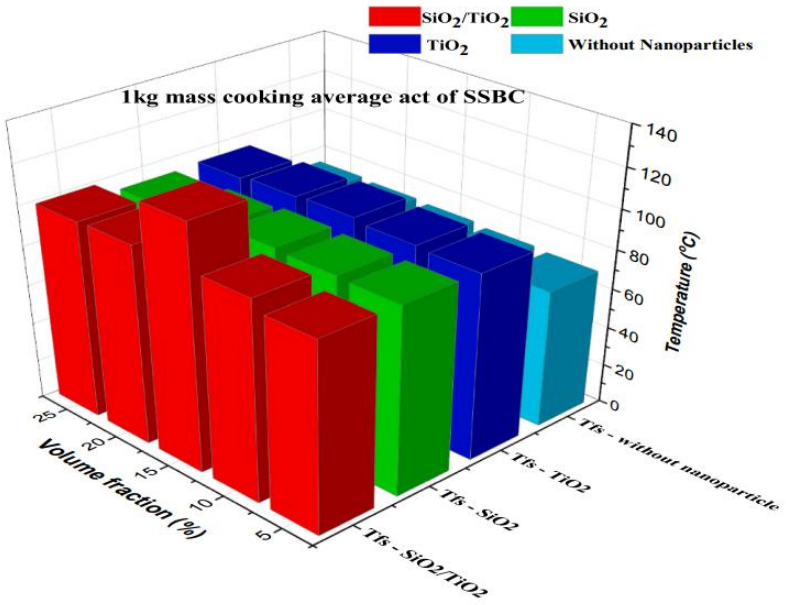

Fig. 9. cooking 1 kg mass

Conclusion

Researcher used bar plate be covered with SiO2/TiO2 nanolayers in various ratios, which allowed for a greater temperature and shorter cooking periods. The SSBC is shown to be a crucial component in enhancing the heat transfer modes. Additionally, the average temperature of the SiO2/TiO2 nanoparticles was somewhat higher reaching values of 12.5%, 16.4%, 16.5%, and 16.3%, respectively.

Reference:

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