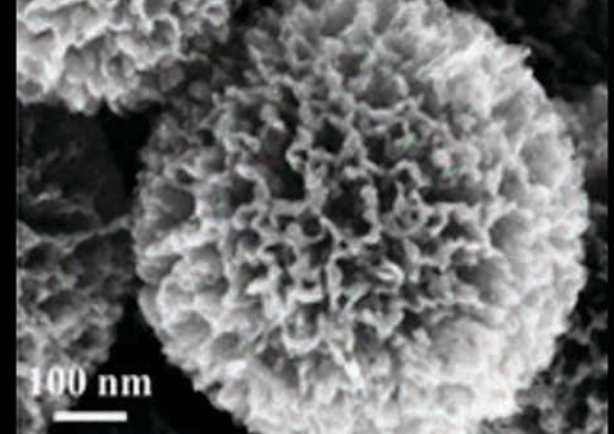


## Harnessing Sunlight to Heat Rooms and Clean Water



**Problem Statement:** Steam forms an essential part of energy conversion in nuclear and thermal power plants, medical sanitisation and water purification. While using non-renewable sources for producing steam involves a large carbon footprint and is becoming unsustainable, a greener alternative using solar energy suffers from a lower rate of steam production. Thus, there is a demand for processes and materials that can efficiently convert solar energy to thermal energy, which can subsequently be channelised for rapid steam generation from water and heating rooms or spaces.

**Uniqueness of the Solution:** Indigenously developed nanocarbon florets (NCF) are coated on various arbitrary surfaces (paper, cloth, clay, metal, glass) to achieve about 90% efficiency in converting solar energy to thermal energy. It was possible to generate a surface temperature of about 150°C upon illumination with 2000 W/m<sup>2</sup> of solar power. This heat energy has

been channelled to generate steam at a high rate of 5 kg/m<sup>2</sup>.h, the highest in the domain, without employing any solar concentrators. Using heat energy thus generated, the team also demonstrated effective bacterial removal of 99.9%, with the initial bacterial concentration of 106 CFU/ml, and green, sustainable space/room heating with a temperature difference of 25°C. The team has demonstrated several months of continuous usage for these three applications.

**Current Status of Technology:** After lab-scale experiments, the team has fabricated a prototype and has shown that it performs well on-field.

**Societal Impact:** The technology developed by the team can be used to set up the purification of water and space heating at a community level and industrial scale. It provides a new and socially-relevant direction for effective solar energy utilisation. The technology

is helpful to realise non-polluting water purification, steam-based sanitisation in medical industries, and non-polluting space heating, especially in areas with abundant sunshine but low ambient temperatures.

**Patent(s):** Nil

**Relevant Industries:** Clean Energy, Water.

**Faculty:** Prof. Sandip Saha, Mechanical Engineering and Prof. Chandramouli Subramaniam, Chemistry.