Highly efficient collectors of solar energy with nanocarbon coating based on vegetable raw materials

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The problem of obtaining solar collectors with high absorbing solar energy capacity is of great practical importance, at the same values of the effective area of the solar collector absorption, heat removal from the absorption of per unit area is increasing.
In this work authors presented The results of study of model samples of the solar collector with an absorption material on the basis of carbonized vegetable raw materials from apricot stones (AS), rice husk (RH) and their combination with carbon nanotubes (CNTs). Studies have shown the possibility and prospects of the use of carbon structures based on carbonized vegetable raw materials for absorbing layer of solar collector. Experimentally, on the basis of a comparative study on the absorption capacity of the coatings from carbonized RH, AS, and their combining with the CNT, it was found that the maximum absorption capacity has coating based on carbonized RH. Structural and morphological properties of carbonized powders of RH and AS were analysed. Carbonized RH and AS were investigated by Raman spectrometer (NTEGRA Spectra Raman, $\lambda = 473$ nm, the signal with area a diameter of 80 nm). As show Raman spectrs, carbonized RH and AS have predominantly amorphous structure. Elemental structure of RH and AS was determined in Energy Dispersive X-Ray Spectroscopy (EDAX). To establish structure and morphology of RH and AS, samples were investigated by Scanning Electron Microscopy (Quanta 3D 200i Dualsystem, FEI).
The analysis of SEM images of carbonized samples of RH and AS show, that structure is porous and has high specific surface area. Also, BET analysis of samples was conducted. It is found that the pore sizes are in the nanometer range. The porous structure of the carbonized AS and RH, and nanometer size of pore increases the scattering of light in the absorbing coating and increase the degree of absorption of solar energy. When compared to the collector of the industrial production in actual use a pilot pattern based on RH showed great efficiency.