NANOCARBON ICING SENSOR AND DEW POIN HYGROMETER

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ABSTRACT

This research is devoted to the development of a totally novel platform of carbon nanomaterial icing sensors and dew point hygrometers and to the fundamental understanding of the adsorption of water molecules, the mechanisms of nucleation of liquid water and crystallization into solid ice at the molecular level and nano-scale.

Our sensor is a film of carbon nanomaterial (carbon nanotubes or graphene oxide).

Water molecules adsorption and phase transition of the first order of water into ice can be precisely detected by measuring of this carbon nanotube or graphene oxide film resistance. Further applications of the icing sensor will help to detect and to prevent the ice building up on specific surfaces like airfoils in aerospace vehicles, and will helps to the development of the methods to mitigate or inhibit icing phenomena.

The sensitivity range of the nanocarbon dew hygrometer (T_D) (frost (T_F)) is extremely wide from as low as -90^{o}C to higher than +30^{o}C. The applications can include the standard ones, like dew point hygrometers and cryopreservation of cells and tissues, food processing, or ice-templating the morphology of materials, etc.