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Space Applications of Graphene, the Next Wonder Material

The outstanding properties have made graphene a rapidly rising star on the horizon of material science, and it is expected to lead to a revolution in many technology areas. Graphene is a strictly two-dimensional material that exhibits exceptionally high crystal and electronic quality. It is the thinnest material known to mankind, yet the strongest one ever measured. It is the most transparent material, yet too dense to be permeable to even helium or hydrogen. The combination of these extreme properties makes graphene useful in many applications that were only possible in science fiction in the past. In addition, graphene is known for superior mechanical and thermal stability, low power consumption, and radiation hardness, which makes it ideal for space applications. In this talk, I will present our work on graphene sensors for various space applications. Specifically, I will focus on ultrasensitive chemical sensors for planetary science and heliophysics applications, strain sensors for structural health monitoring of spacecrafts and photonic sensors for Earth science and heliophysics applications.