Magical Properties of Two-Dimensional Materials: Graphene like structures can enhance nano-technology and prove to be better substitutes, Dr Priya Johari, Assistant Professor, Department of Physics, Shiv Nadar University

Dr Priya Johari, Assistant Professor, Department of Physics has been awarded the **"**Fast Track Scheme for Young Scientist in Physical Sciences" grant by the Department of Science and Technology (DST). This grant has encouraged Dr Priya Johari to carry out research in exploring the magical properties of two-dimensional materials. Graphene's extraordinary properties has made it the most studied two-dimensional material and the Nobel prize awarded to Andre Geim and Konstantin Novoselov at the University of Manchester "for groundbreaking experiments regarding the two-dimensional material graphene" has also encouraged researchers to investigate graphene in more detail and explore other two-dimensional materials, as well, which possess exceptional properties like graphene. In past few years, several innovative techniques have been made to study chemically and structurally modified graphene in order to explore all possible applications of this one carbon atom thick material. The current scenario depicts that most of the innovative studies on graphene and related systems are experimental. Theoretical studies are mainly related to graphene and its nanostructures like nanotubes, nanoribbons and nanodisks, and still lack investigation of modified-graphene-hybrids such as graphene-TMDs, graphene-DNA, graphene-azo, graphene-bacteria, graphene-proteins, graphene-gold, etc. Therefore, she plans to explore the hybrid systems of graphene and various materials of interests in the field of bio-technology and medicines, nano-science and technology, and energy generation and storage. Moreover, she also plans to study transition metal dichalcogenides (TMDs) which are rapidly coming up as the promising substitute of graphene. Graphene has the limitation on the device front because of its zero band gap, while semiconducting TMDs possess a band gap which can be easily tuned and a transition in its properties can be achieved by changing it from semiconducting to metallic and from direct-to-indirect band gap material and vice-versa. Dr Priya Johari plans to study two dimensional materials and their hybrid films using first-principles density-functional based methods for applications and to aid experiments. Dr Priya feels, "The materials having similar structures like Graphene can enhance nano-technology in the areas of opto-electronics, bio-medicine, as well as energy storage and generation and can prove to be better substitutes of Graphene."