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Glass, graphene and collective behaviour

In recognition of his significant contributions to diverse areas of physics, Ajay Sood was recently elected as a Fellow of The Royal Society, the most prestigious scientific body in the world. Much like his previous work, Sood's recent research—ranging from flocking behavior to the formation of glass—reflects the diversity and the interdisciplinary nature of his interests.

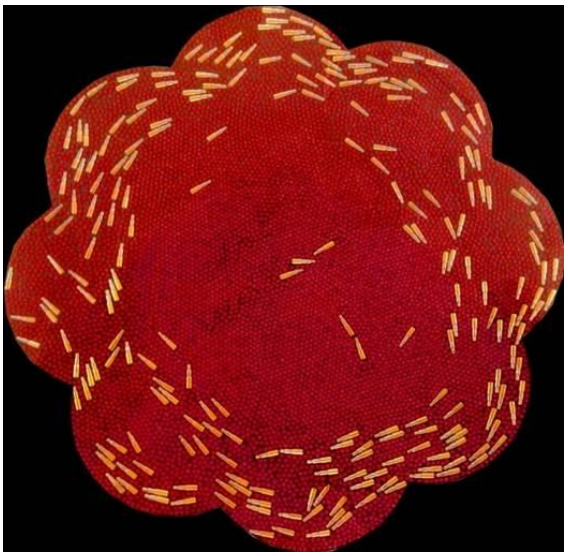
Flocking is a collective motion of self-propelled entities, an example of how complex group behavior can emerge from simple rules followed by individuals with no central coordination. Sood and his group are studying this phenomenon using small metal

spheres and brass bits. This study would help in understanding how organisms like microbes, ants, birds etc aggregate and move together; this, in turn, may also help in evolving more effective protocols in managing crowds and traffic which are also self-organizing phenomena.

Towards ultrafast optoelectronic applications of graphene, Sood's experiments on optical pumps—terahertz probes—using femtosecond laser pulses have provided insights into the microscopic behaviour of photoexcited electronic carriers in graphene. The dominant processes contributing to the photo-conductivity have been delineated for the first time in a quantitative way.

Sood's team has also developed a new sensitive and accurate platform for biosensors using nanomaterials like graphene and etched Fibre Bragg Grating (eFBG) in collaboration with S Asokan, a Professor at the Department of Instrumentation and Applied Physics. This has been used to detect C-reactive protein (CRP), a biomarker to indicate inflammation in the body. The CRP detection has been carried out by monitoring the shift in Bragg wavelength of an eFBG.

In close collaboration with R Ganapathy at the Jawaharlal Nehru Centre for Advanced Scientific Research, Sood's team is also addressing a long-standing unsolved problem of how glass is formed using colloidal systems and experimental probes of confocal microscopy and holographic optical tweezers.



Flocking in active granular media

Sood with his team (Manoj Sudhakaran)