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By: Gabriel Gache, Science News Editor

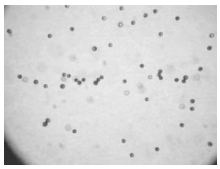

Image of Janus particles in a liquid suspension
North Carolina State University

Janus Particles Behave Like Tiny Submarines

Scientists create way to control microscopic particles

The Janus particle name is given to any microscopic sphere which is composed of two halves that are chemically or physically different. North Carolina State University researchers have demonstrated that while being submerged into a liquid excited by an alternating electrical field, Janus particles start to behave like microscopic submarines, property which could be easily exploited to create smart materials, such as microscopic engines or sensors that can be controlled by imputing changes into the environment in which they are found. The findings are being detailed by the lead author of the study, Dr. Orlin Velev, an associate professor of chemical and biomelocular engineering at North Carolina State University, along with colleagues Sumit Gangwal, Dr. Olivier Cayre and Dr. Martin Bazant from Massachusetts Institute of Technology. The tiny spheres that they have created consist of half gold, half plastic material that can be moved through a body of water by applying a low frequency alternating current, averaging about 50 hertz. As the electrical current is being applied, the particles start to convert the energy of the electrical field into motion, moving in a direction corresponding to that of the electrodes which provide the power, contrary to the belief that they should have followed a trajectory oriented to the electrical field. Velev writes that the Janus particles seem to conserve the orientation in relation to the direction of movement, meaning the plastic half of the sphere is always the leading face and the gold half faces towards the rear. The whole process is based on a phenomenon previously predicted but not demonstrated, called 'induced-charge electrophoresis,' and could be used to create drug releasing environments or special microscale materials. Velev claims that his team was able to create Janus particles of the same size and learned how to control their movement in a liquid environment. He has also stated that the research in this field will continue in the hope that they will be able to implement more complex particles in order to give them function and the ability of self propulsion.