Nano-tech makes medicine greener

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Over the last 5 years the Bionano Group at the Nano-Science Center and the Department of Neuroscience and Pharmacology at the University of Copenhagen has been working hard to characterise and test how molecules react, combine together and form larger molecules, which can be used in the development of new medicine.

The researchers' breakthrough, as published in the prestigious journal *Nature Nanotechnology*, is that they are able to work with reactions that take place in very small volumes, namely 10-19 liters. This is a billion times smaller than anyone has managed to work with before. Even more intriguing is the ability to do so in parallel for millions of samples on a single chip.

"We are the first in the world to demonstrate that it is possible to mix and work with such small amounts of material. When we reach such unprecedented small volumes we can test many more reactions in parallel and that is the basis for the development of new drugs. In addition, we have reduced our use of materials considerably and that is beneficial to both the environment and the pocketbook," says professor Dimitrios Stamou, who predicts that the method will be of interest to industry because it makes it possible to investigate drugs faster, cheaper and greener.

The team of professor Stamou reached such small scales because they are working with self-assembling systems. Self-assembling systems, such as molecules, are biological systems that organise themselves without outside control.

This occurs because some molecules fit with certain other molecules so well that they assemble together into a common structure. Self-assembly is a fundamental principle in nature and occurs at all the different size scales, ranging from the formation of solar systems to the folding of DNA.

"By using nanotechnology we have been able to observe how specific self-assembling systems, such as biomolecules, react to different substances and have used this knowledge to develop the method. The self-assembling systems consist entirely of biological materials such as fat and as a result do not impact the environment, in contrast to the materials commonly used in industry today (e.g. plastics, silicon and metals). This and the dramatic reduction in the amount of used materials makes the technique more environment friendly, 'greener'," explains Dimitrios Stamou, who is part of the Synthetic Biology Center and director of the Lundbeck Center Biomembranes in Nanomedicine.

Provided by University of Copenhagen