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Padova, 21 marzo 2017

ELECTROCRYSTALLIZATION: BREAKTHROUGH IN GOLD NANOPARTICLE RESEARCH

Italo-finnish research team discovers how to prepare high-quality crystals formed of gold nanoparticles

A research team led by **Professor Flavio Maran** of the University of Padova (Italy) and **Academy Professor Kari Rissanen** of the University of Jyväskylä (Finland) has published in the prestigious Journal of the American Chemical Society a research study that demonstrates how it is possible to obtain very high quality crystals formed of gold nanoparticles.

«The research on gold nanoparticles is a field of both fundamental and applied importance - explains Professor Maran of the Department of



Chemical Sciences at the University of Padova-. X-ray crystallography is the most powerful method for molecular-structure determination of these nanosystems, but obtaining good quality single crystals suitable for accurate X-ray analysis has been the bottleneck in this demanding research. This problem has now been successfully addressed thanks to an electrochemical strategy called electrocrystallization. »



X-ray single crystal diffraction analysis of gold nanoclusters - structures composed of a core formed of dozens gold atoms capped and protected by a layer of molecules - has the intrinsic limitation that good quality single crystals are very difficult to obtain. The team has developed an electrochemical method that allows growing high-purity crystals in large quantities and very high crystallographic quality. By allowing a very small current to flow between

two electrodes, dense forests of millimeter-long single crystals can be generated directly onto the electrode surface.

«The breakthrough nature of this electrocrystallization method - continues Professor Maran - was put in practice by the single crystal X-ray crystallographic determination of the structures of four different nanoclusters each formed of 25 gold atoms. Not only these successful results validated the efficacy of the electrochemical technique, but also led to the discovery that one of these clusters crystallizes by forming needles consisting in parallel chains of interconnected gold nanoclusters, just like a multiple-strand necklace made of gold "pearls" of only one-billionth of a meter.»



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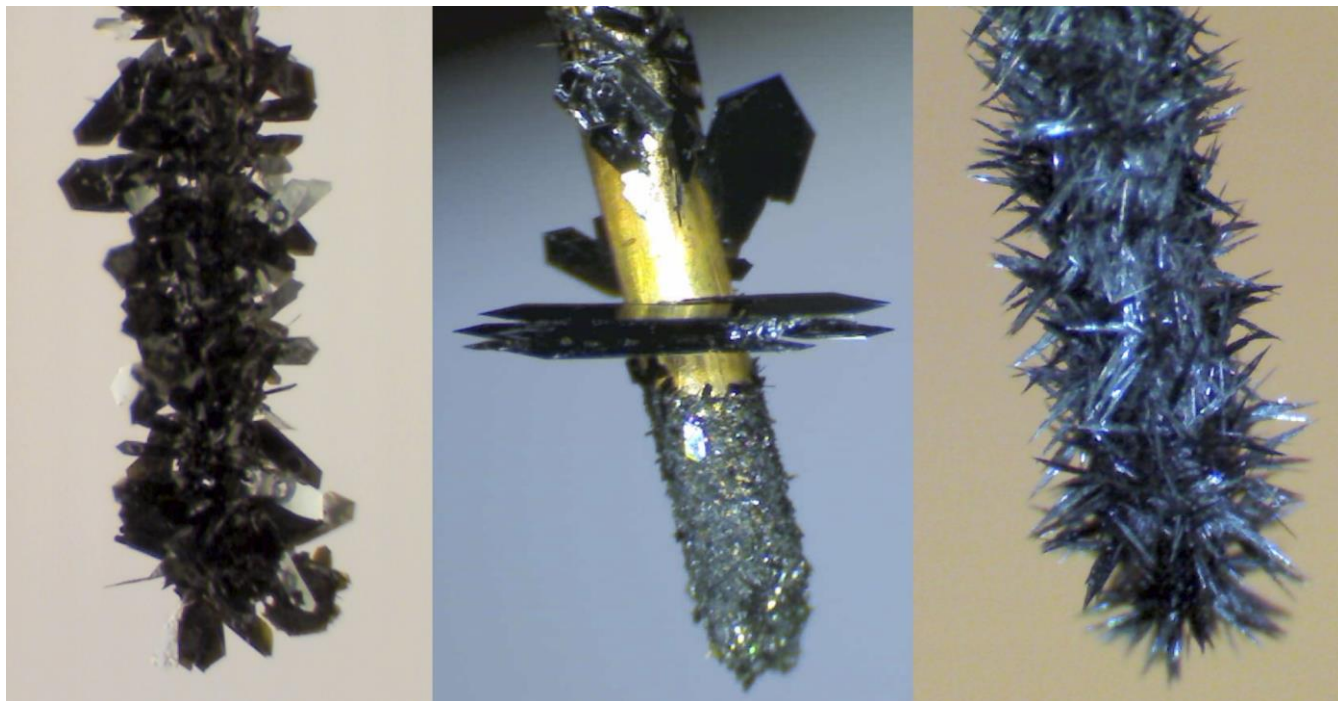
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The full text of the article is available at <http://pubs.acs.org/doi/abs/10.1021/jacs.7b00568>