Superior crystals grown from levitating droplets

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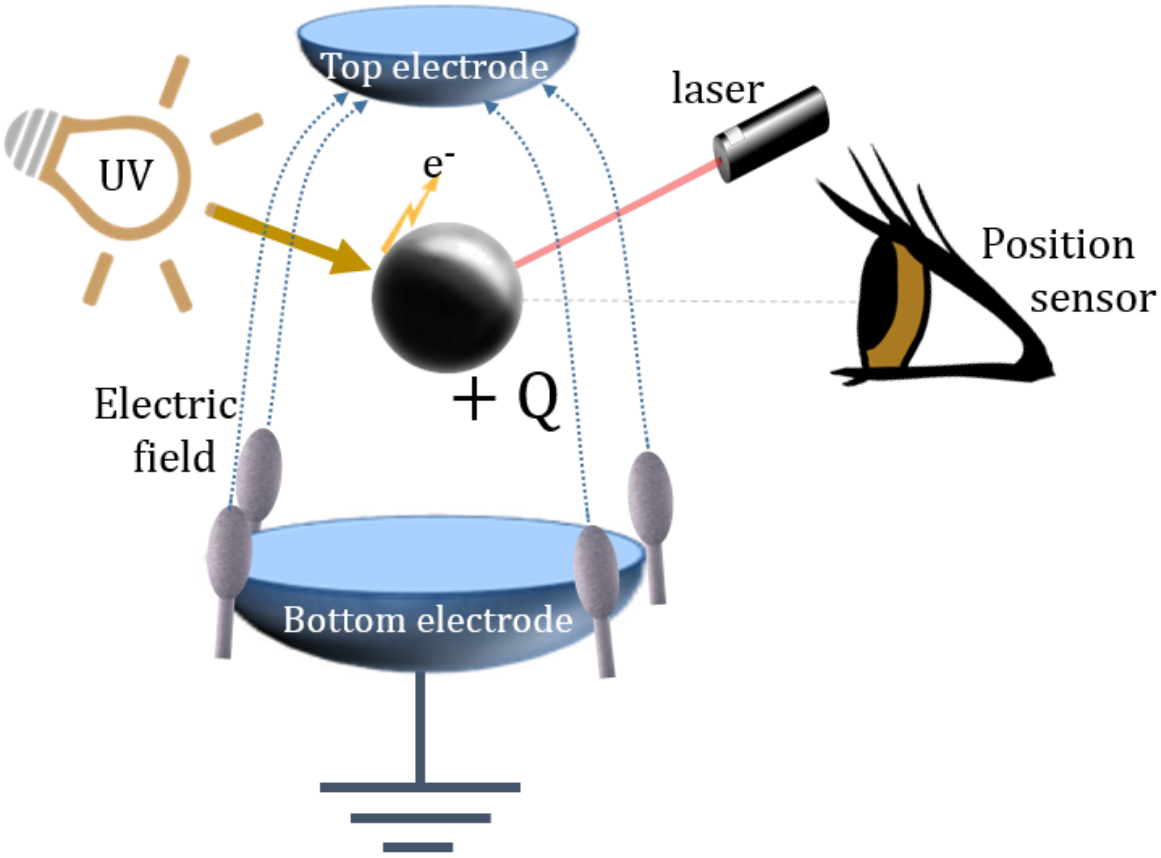

Electrostatic levitation. The UV source causes the metal to be ionized, giving it an electric charge and causing levitation in between the electrodes. The laser melts the metal. The new project involves electromagnetic in stead of electrostatic levitation. Credit: University of Twente

Crystals that don't experience mechanical stress during growth have superior quality. Levitating liquid metal is the idea behind the project 'Perfecting metal crystals' led by the University of Twente in the Netherlands.

The UT scientists want to grow crystals from a metal melt that is levitated by an electromagnetic field under vacuum conditions. Because the liquid isn't mechanically stressed by the walls of a container, crystal defects can be kept to a minimum. Crystals with superior properties have applications in the semiconductor industry and synchrotrons. The research project will be conducted in close cooperation with the Dutch company Surface Preparation Laboratory (SPL), market leader in crystal surfaces of very high quality.

The most common crystal growth technique involves melting the metal inside a container. Inserting a lower temperature stick with a seed crystal and subsequently pulling it out results in crystal growth. However, the process is subject to stress and contamination by the container wall surface. The crystals may contain carbon as a result, says Dr. Arie van Houselt of the Physics of Interfaces and Nanomaterials group (UT's MESA+ Institute for Nanotechnology). Growing crystals by levitating liquid metal is a promising idea, but it is technically challenging to keep the liquid in place.

The UT group will characterize the newly formed crystals using a range of techniques like low-energy electron microscopy (LEEM) and atomic force microscopy (AFM). Their colleagues at the University of Leiden, involved in the project, will focus on the chemical properties.

Provided by University of Twente

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