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With the new analytical technique, the scientists employ electron microscopy to examine protein complexes in whole cells in their natural aqueous environment. The protein in question, the TRPV6 calcium channel forming protein, is first provided with an "anchor to which a gold nanoparticle can bind. Each nanoparticle thus shows the position of a protein subunit so that the composition of the channels from a multiple of proteins and their locations become visible as they are in the living cell.
The cells are examined in tiny liquid chambers using the electron microscope. "Liquid specimens cannot be studied with traditional electron microscopy, explains Professor Niels de Jonge, head of the Innovative Electron Microscopy group at the INM. Cells are typically studied in dry state via thin sectioning of solid dried plastic embedded or frozen material, which means that the proteins are no longer in their intact and natural environment. Using tiny liquid chambers the whole cells can now be examined in an aqueous environment. The chambers are made from silicon microchips and have very thin, electron transparent silicon nitride windows.
Research by the electron microscopy experts at the INM is focussing on two aims: "We are keen to perfect our new technology and demonstrate that its application is useful for biological and pharmaceutical research. Researchers at the INM are therefore working closely with scientists from the Clinical and Experimental Pharmacology and Toxicology Department at the Saarland University.
Background:
Liquid STEM is an electron microscopy method developed by Niels de Jonge. STEM stands for Scanning Transmission Electron Microscopy, a microscopy modality in which a sample is raster scanned by an electron beam and electrons transmitted through the sample are detected. Liquid refers to the application of STEM for specimens in liquid.

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INM conducts research and development to create new materials - for today, tomorrow and beyond. Chemists, physicists, biologists, materials scientists and engineers team up to focus on these essential questions: Which material properties are new, how can they be investigated and how can they be tailored for industrial applications in the future? Four research thrusts determine the current developments at INM: New materials for energy application, new concepts for medical surfaces, new surface materials for tribological applications and nano safety and nano bio. Research at INM is performed in three fields: Nanocomposite Technology, Interface Materials, and Bio Interfaces.
INM - Leibniz Institute for New Materials, situated in Saarbruecken, is an internationally leading centre for materials research. It is an institute of the Leibniz Association and has about 195 employees.
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Das INM erforscht und entwickelt Materialien ? für heute, morgen und übermorgen. Chemiker, Physiker, Biologen, Material- und Ingenieurwissenschaftler prägen die Arbeit am INM. Vom Molekül bis zur Pilotfertigung richten die Forscher ihren Blick auf drei wesentliche Fragen: Welche Materialeigenschaften sind neu, wie untersucht man sie und wie kann man sie zukünftig für industrielle und lebensnahe Anwendungen nutzen?Das INM ? Leibniz-Institut für Neue Materialien gGmbH mit Sitz in Saarbrücken ist ein international sichtbares Zentrum für Materialforschung. Es kooperiert wissenschaftlich mit nationalen und internationalen Instituten und entwickelt für Unternehmen in aller Welt. Das INM ist ein Institut der Wissenschaftsgemeinschaft Gottfried Wilhelm Leibniz e.V. und beschäftigt rund 180 Mitarbeiter. Seine Forschung gliedert sich in die drei Felder Chemische Nanotechnologie, Grenzflächenmaterialien und Materialien in der Biologie.