

# New standard mass made with ISTC help

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This program began three years ago and it involves scientists from eight countries. The task is immense. A new standard mass will be created with maximum possible precision on a modern level of development for world science and technology.

Of the multitude of measurable values, the most important and the most basic, are time, length and mass. Standards of mass and length were made over one hundred years ago, in the form of the standard kilogram and the standard meter; they are held at the International Bureau of Weights and Measures in Paris. The standard hour was determined through the period of the Earth's rotation.

Alas, however, it transpired that these standards are unstable. For over 50 years scientists from across the world have been trying to create an ideal standard mass: to produce a solid that consists of a known quantity of identical atoms, and weigh it. The problem lay in there not being a suitable material.

Now, however, thanks to the efforts of Russian scientists, such a material is available. More precisely, it will become available in the required quantity within the next few years. It is superpure silicon – pure in the sense that the vast majority of its composition is made up of silicon-28 atoms. As far as other impurities are concerned, including other silicon isotopes, they may be found in proportions not exceeding one atom for every 10 million silicon-28 atoms.

The first 140 grams of the superpure monoisotopic silicon have been obtained in the framework of an international project on the creation of

a new standard mass. It is superpure silicon, 99.99% comprised of the silicon-28 isotope. There will be 5kg of such silicon in three years time. This will be sufficient to produce a kilogram sphere, the number of silicon-28 atoms in which will be known precisely. At last the outdated weight held at the Bureau of Weights and Measures in Paris will be replaced by a standard in which not only the mass, but also the number of atoms will be defined to the maximum achievable limit of accuracy for world science today.

For the first time scientists the world over will be able to clarify one of the most fundamental chemical values – the Avogadro Constant. However, this project promises a solution not only to fundamental tasks. Development of the technology to obtain superpure silicon isotopes could lead to changes in microelectronics that are no less than revolutionary, just like the changes that eventually enabled the power and rapid action of three-storey high giant computers to be replaced by notebook machines.

Source: International Science and Technology Center (ISTC)

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