A molecular LEGO brick

Imagine that we have at our disposal a set of LEGO® construction bricks of nanometric dimensions (there are one million nanometers in one millimeter)! We would then be able to use these “nano-bricks” to construct “nano-buildings” and other “nano-objects” of different shapes and with tailor-designed properties for novel applications in nanotechnology. A group of researchers working at the Spanish National Research Council in Madrid has taken the first steps in that direction by preparing the first example of a cubic-shaped molecule with two different opposed faces, like a LEGO brick. This is the first example described of a perfect “Janus nanocube”.

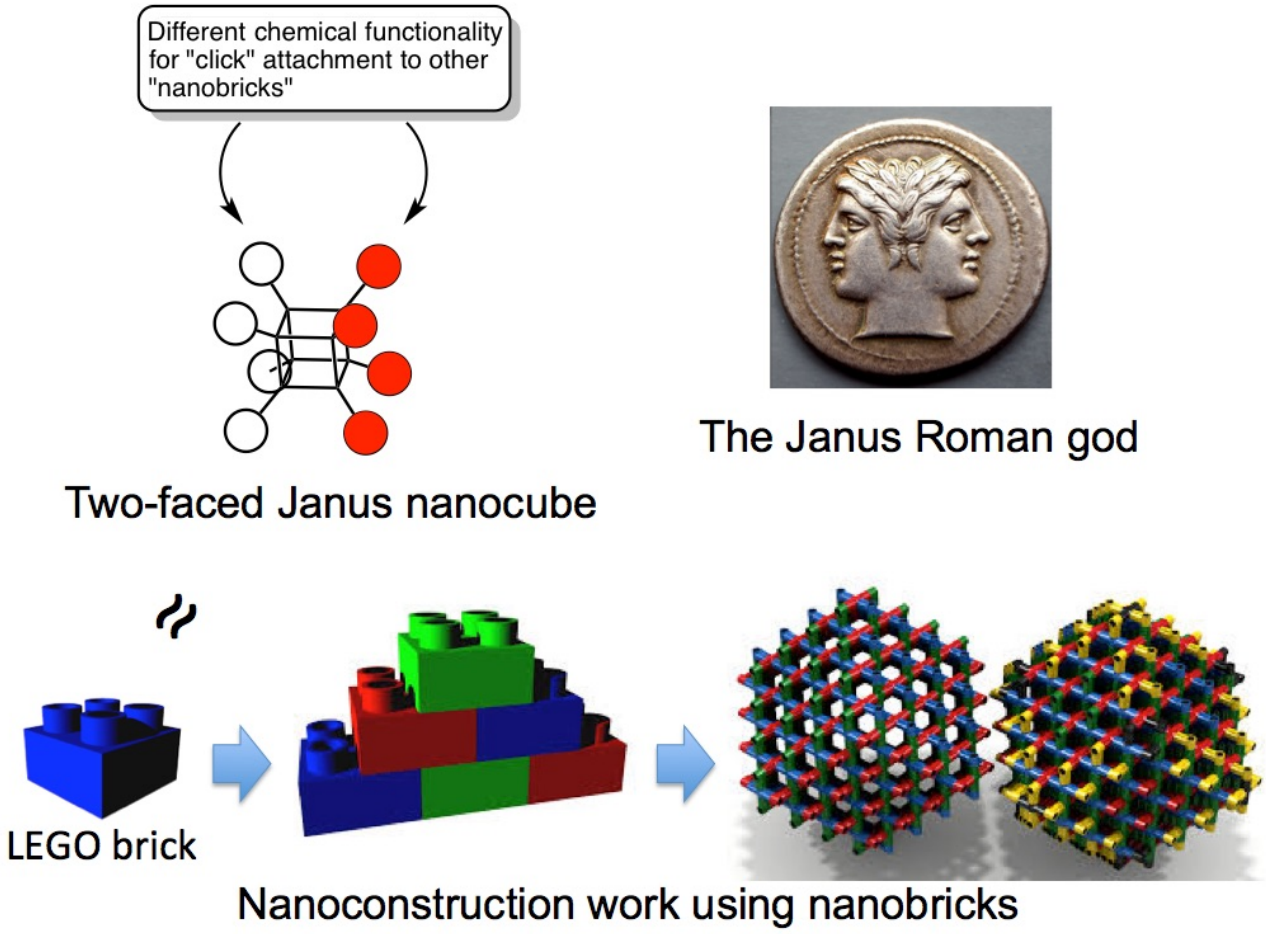

Fig. 1.

Objects like this, with two different opposed faces, are named after the two-faced Roman god Janus, god of beginning and ending, doors and gates, from which the month January received also its name. The Janus nanocube is equipped with appropriate molecular functions for its permanent

attachment (via stable covalent bonds) to other molecules or nano-bricks. The chemical functionality is such that the Janus system is able to react with partners using what chemists call “click” chemistry. “Click”-type reactions are very high yielding and incorporate in the product all the atoms of the reacting molecules thus minimizing chemical waste and simplifying the experimental procedures and isolation of the final product, very much like joining two LEGO bricks in our macroscopic world. The present research opens the door for the nanoconstruction work described above in an efficient and chemically controlled way.

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Publication

Efficient multi-click approach to well-defined two-faced octasilsesquioxanes: the first perfect Janus nanocube.
Blázquez-Moraleja A, Eugenia Pérez-Ojeda M, Suárez JR, Luisa Jimeno M, Chiara JL
Chem Commun (Camb). 2016 Apr 30