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## Nanocubes Could Carry Drugs

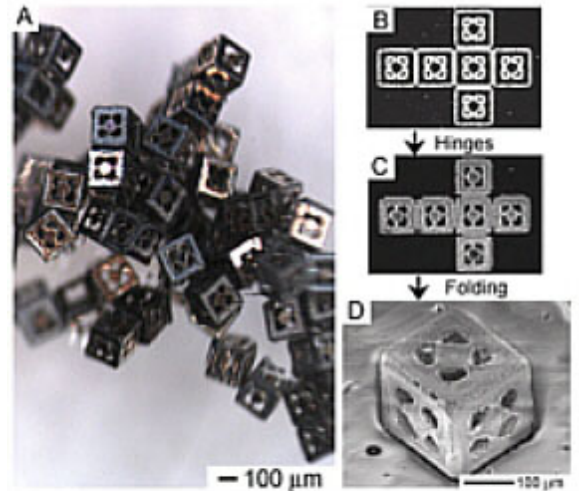
**Scientists have created tiny boxes that can hold and dispense medicine and cells.**

December 13, 2005

Researchers from Johns Hopkins University have created a self-assembling nanocube capable of holding and dispensing microbeads and live cells frequently used in medicine.

Details of the tiny containers' successful performance in laboratory tests and the scientists' method of manufacture are reported in the December issue of the journal *Biomedical Microdevices*.

"We believe these self-assembling microcontainers have great potential as a new tool for medical diagnostics and treatment," said David H. Gracias, assistant professor in the department of biomolecular and chemical engineering at Johns Hopkins.



Images of the nanocubes at different stages of the fabrication process.  
Photo Credit: Johns Hopkins University

The metallic cubes, which are smaller than a speck of dust, have several selling points as a potential new method of treatment. First, their position inside the body could be traced with magnetic resonance imaging.

Second, they could be mass-produced and relatively inexpensive to make because their manufacturing process borrows techniques from electronic chip-making and they self-assemble.

### Cubes as Smart Pills

Mr. Gracias hopes the microcontainers might one day act as biosensors inside the body, releasing medication when the patient requires it or in response to a remote-controlled radio signal.

"We're talking about an entirely new encapsulation and delivery device that could lead to a new generation of smart pills," said Mr. Gracias. "The long-term goal is to be able to implant a collection of these therapeutic containers directly at the site of an injury or an illness."

The cubes consist of six squares of copper

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or nickel with small openings etched into them. The trick of creating the containers was to make extremely precise hinges, ensuring that the cube folds accurately.

Once assembled, the cubes are coated with an extremely thin layer of gold to avoid chemical reactions between the metal and the body.

The recently published tests show that microbeads commonly used in cell therapy can be inserted into the nanocubes using micropipettes, and that these are released again when the cubes are agitated.

Microbeads are tiny, commercially available glass spheres. Therapeutic chemicals are attached to their surface to deliver various medications.

The researchers also managed to insert human cells, which both stayed alive inside the cubes and were easily released.

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