Gold particles, Darwinian evolution: Unlikely combination joins to carry out computing

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Move over, microchip. A random assembly of gold nanoparticles can perform calculations normally reserved for neatly arranged patterns of silicon.

Traditional computers rely on ordered circuits that follow preprogrammed rules, but this strategy limits how efficient they can be.

"The best microprocessors you can buy in a store now can do 10^{11} operations per second and use a few hundred watts," says Wilfred van der Wiel of the University of Twenty in the Netherlands. "The human brain can do orders of magnitude more and uses only 10 to 20 watts. That's a huge gap."

To close that gap, researchers have tried building "brain-like" computers that do calculations without their innards having been specifically laid out for the purpose, but so far no one had found a material that could reliably perform real calculations.

Now, van der Wiel and his colleagues have enabled a clump of gold grains to handle bits of information in the same way that conventional microprocessors do.

They started with random combinations of voltages and learned which were the most useful using a genetic algorithm, a procedure that borrows ideas from Darwinian evolution to home in on the "fittest" ones.

It compared many sets of voltages, discarding those for which the unit's behaviour made no sense, creating slightly different versions of those that seemed promising, and trying again. In effect, the clump of gold particles was evolving towards the behaviour the researchers hoped to get.

Read full, original post: Clumps of gold nanoparticles can evolve to carry out computing