Researchers demonstrate reconfigurable clusters made of colloidal particles as a form of data storage

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A team of researchers with member affiliations to a large number of universities in the U.S. has created clusters of colloidal particles (spheres) in a liquid that is able to be manipulated in such a way as to represent different states such as "0" or "1" thereby suggesting a novel way to store large amounts of data in a small amount of liquid. In their paper published in the journal *Soft Matter*, the team describes their findings and suggests that soft matter may hold potential as a digital colloid for possible data storage in the future.

Colloids are substances made of either large molecules or other tiny particles that are dispersed in another substance—examples include gels, emulsions and sols. The particles do not settle and therefore remain distributed throughout the second substance. In this new research the particles were very tiny dimpled spheres suspended in a clear liquid. A number of spheres were clustered around a single central sphere, and it's the arrangement of the cluster that is used to represent a state—the dimples help keep the spheres stable once in place. In their lab, the researchers created a single entity consisting of four spheres clustered around a single sphere on the scale of approximately 5 μm—representing the most basic state, one capable of representing either a "0" or a "1", i.e. a digital colloid. The team notes that capacity could be increased by increasing the size of clusters. Such clusters, the team suggests represent the possibility of small amounts of liquid holding very large amounts of information—a terabyte of data in just a single tablespoon, for example.

The whole idea is still in its infancy, and the team has not yet worked out a way to read the clusters, though they suggest data could be stored by making use of materials to construct the spheres in such a way as to allow for changing the size of the central sphere on demand, thereby changing cluster shape. The group suggests digital colloids might be useful in soft robotics or perhaps they may add to the variety of ways large amounts of data are stored in very small ways in the future.

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