



Figure 2 Two structural isomers can be obtained by linking the vertices of molecular squares. **a**, A triangular Kagomé lattice, and **b**, a square lattice. Because only the first one exhibits spin frustration, the magnetic properties of the two lattices are very different.

facile synthetic routes, and inexpensive chemical building blocks.

Because of the inherent nanoporosity of this nanoscale lattice it will be possible to incorporate guests that impart different functionality to the magnetic properties of the Kagomé lattice framework. In particular, those in the field envision that metallic conductors, organic conductors, or organic chromophores could be incorporated into the lattice. Another feature of this system that appeals to crystal engineers is modularity. Many of the components are easily interchangeable. For example, most transition metals can be used to form the dimetal tetracarboxylate units. The bdc ligand can also be derivatized at any of four positions without changing its ability to sustain a Kagomé lattice, or other bridging ligands can be used, in particular dicarboxylates with similar angles to that formed by bdc.

In summary, the structural and chemical features of this nanoscale Kagomé lattice make it a good prototype for a wide range of related structures, and its nanoscale channels mean that it should be possible to generate multifunctional properties that are rationally tied to structure and composition. With such a toolkit, the potential structures are limited only by the imagination.

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MATERIAL WITNESS Old conflicts of interest



Government in the pocket of big-business paymasters. Academic integrity compromised by commercial conflicts of interest. No, this is not a story about the oil or tobacco industries, but about the European materials economy in the sixteenth century.

The era of Leonardo da Vinci, Erasmus and Copernicus was a time of shifting power structures: the feudal hierarchy of the Middle Ages was giving way to the modern system of mercantile capitalism. Hans Fugger, a textile merchant of Augsburg, established a thriving firm in the late fourteenth century, and his son Jakob expanded the business by acquiring a share of the silver-mining industry in the Tyrol. But it was his son, also named Jakob, who turned this profitable trade into an instrument of power and influence.

Jakob the younger began to lend money to princes and lords, whose finances were stretched by the constant wars waged in Europe in the late fifteenth century. In 1487, Jakob Fugger effectively gained control of all silver production in the Tyrol. He widened the family's mining interests to Spain and Hungary, and set up banks all across Europe for money lending.

His most eminent client was Maximilian I, the Holy Roman Emperor, whose empire was vast, unwieldy and under threat from France, the Turks, the Italian states and the Lutherans within. When Maximilian died in 1519, his grandson Charles I of Castile came to the Fuggers for a loan that allowed him to bribe his way to becoming the next Emperor.

Jakob Fugger later reminded Charles silkily of his indebtedness: 'it is also well known and clear as day that your Imperial Majesty could not have acquired the Roman Crown without my help.' Now business called the tune even with the head of Christendom.

The financial power of the Fuggers gave them control over academia too. Using their influence over Charles, they acquired a monopoly on imports of guaiac wood from the New World, considered a miracle cure for the dreaded disease of syphilis. The guaiac decoctions were actually rather ineffective, but when the Swiss physician Paracelsus tried to say so in 1530, his book was suppressed by the Nuremberg publishers.

They had sought the advice of an independent referee, Heinrich Stromer of the University of Leipzig, who recommended that the book be banned. What Stromer neglected to mention was that he owned shares in the Fugger's guaiac import business.

The social and political contexts of the sixteenth century of course bear little relation to those today, and it would be disingenuous to suggest that we have much to learn about the ethics of research or business from the tale of the Fuggers. Except, perhaps, to say that the tension between the free market, freedom of research and democracy is apparently a fundamental one and not the product of any special set of circumstances.

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