The bizarre world of topological materials

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In 2016, three physicists received the Nobel Prize for using the mathematical concept of "topology" to explain the strange behavior of certain materials—for example, those that are insulators in their bulk but conductors on their surface. Now, researchers are investigating applications for these exotic materials in electronics, catalysis and quantum computing, according to an article in *Chemical & Engineering News* (*C&EN*), the weekly news magazine of the American Chemical Society.

Topological materials are unusual for the robustness of their electrical properties, even when the temperature shifts dramatically or their physical structure is deformed, writes Contributing Editor Neil Savage. This ruggedness results from certain stable electronic states within the materials, which typically contain heavy metals. When electrons in a current hit a defect in the material, they simply flow around it, instead of being scattered or experiencing resistance as in traditional conductors.

Once solidly in the realm of theoretical physics, topological materials are now working their way into the world of experimental chemistry. Some compounds, such as niobium phosphide, show great promise as catalysts. Others could improve the information-storage capacity of devices or help build powerful quantum computers. To hasten the search for new topological materials, researchers recently developed a method for determining whether a material is topological based on its constituent elements, crystal structure and positions of atoms.

More information: "Topological materials move from the world of

theoretical physics to experimental chemistry,"
cen.acs.org/articles/96/i26/To … rld-theoretical.html

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