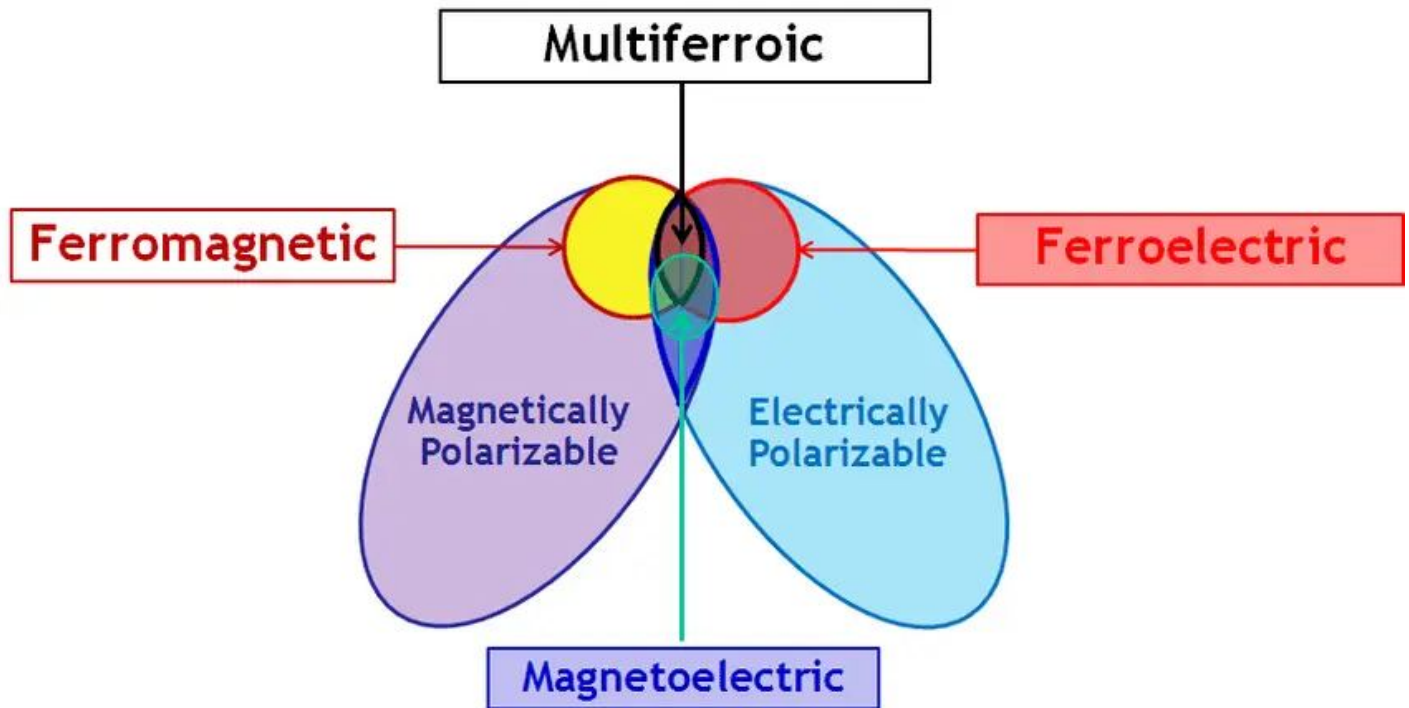


Magnetoelectric multiferroics

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About Magnetoelectric multiferroics

- These are a special class of materials popular among the research fraternity for their rarity and unique properties.
- These materials can exhibit both magnetism and ferroelectricity simultaneously.
- Application: For advanced technology applications like spintronics, electronic memory devices, and other electronic components like actuators and switches.

What is MnBi_2S_4 ?

- It is also known as mineral graïanite and belongs to the ternary manganese chalcogenide family.
- It has distinct magnetic structures in the material, including a spin density wave, as well as cycloidal and helical spin structures.
- It is also known to be centrosymmetric, undergoes magnetic ordering at low temperatures (27, 23, and 21.5 Kelvins).

Significance of the study

- The significance of this finding lies in the strong coupling between magnetism and electric polarization.

- The unique mechanism, driven by magnetic frustration, represents a breakthrough in magnetoelectric coupling.
 - Specifically, if the material possesses the ability to exhibit the same phenomena at room temperature, it could pave the way for energy-efficient manipulation of spin using small electric fields.
 - This could revolutionize data storage by reducing energy consumption during writing processes.
 - These findings can be helpful for the development of four-state logic memory system, providing additional degrees of freedom for device performance compared to the current binary logic systems.
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Q1) What is Magnetism?

It is the force exerted by magnets when they attract or repel each other. Magnetism is caused by the motion of electric charges. Every substance is made up of tiny units called atoms. Each atom has electrons, particles that carry electric charges.

Source: [Scientists uncover unique properties in a multiferroic material potential for energy-efficient data storage](#)

Source: <https://vajiramandravi.com/current-affairs/magnetoelectric-multiferroics/>

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