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## Silver Antimony Telluride: A Material to Tap Waste Heat

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### Why in News

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Scientists at the **Bengaluru-based Jawaharlal Nehru Centre for Advanced Scientific Research**, have found a new material, **Silver Antimony Telluride (AgSbTe<sub>2</sub>)**, that can help in tapping waste heat produced by all kinds of domestic and industrial appliances, and use it to accomplish other useful work.

Basically, the material will **exploit the benefits of thermo-electric effect**. The thermo-electric effect **involves the process by which heat is transformed to electrical energy**.

### Key Points

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- **Background:**
  - Traditionally, the **thermo-electric effect has been demonstrated** and utilised **by using two different metals** joined together, and **by mechanically maintaining two different temperatures** at the ends. But **such materials do not offer efficient or economical solutions**.

Further, most materials that conduct electricity, also happen to be good conductors of heat. That means that **there would not be any significant temperature difference between the two ends** of the material for very long.
  - To date, the most efficient thermoelectric materials **use lead as a major constituent element**, but lead has very **adverse environmental impacts** such as air pollution and also causes human health issues.

- **About Silver Antimony Telluride:**

- It is a **nanomaterial** compound synthesised from **Silver, Antimony and Tellurium**.
- A crystalline solid, it has free electrons that help in conduction of electricity but its lattices (arrangement of atoms) are rather inflexible, and vibrate quite slowly thereby inhibiting the propagation of heat.

Thus, it is a **good conductor of electricity but a bad conductor of heat**, a property **important for Thermo-electric effect**.

- There are a **variety of potential applications**. Industrial processes and power plants, along with all kinds of domestic appliances, produce ample amounts of waste heat that can be utilised to do significant amounts of work.

The heat from the laptop, for example, can be used to charge a mobile phone. Or, that from the phone can be used to charge a small watch.

- **Challenge:**

The energy conversion is not a very efficient process. Typically, **not more than 15 to 20% of the waste heat can be utilised**.

**Source: IE**