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Invisible Shield against Electromagnetic Interference

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Why in News

Recently, scientists from the **Centre for Nano and Soft Matter Sciences (CeNS)**, Bengaluru, have **designed a metal mesh structure** to construct an **invisible shield** against **Electromagnetic Interference (EMI)**.

CeNS is an autonomous institute under the Department of Science & Technology, Government of India.

Electromagnetic Interference

- EMI is an **electromagnetic emission** that **causes a disturbance** in another piece of electrical equipment.
Any device that has an electronic circuit can be susceptible to EMI.
- It **compromises the performance** of electrical equipment by obstructing and degrading data, sometimes even losing data completely.
- EMI can be **attributed to a wide span of the electromagnetic spectrum** including radio and microwave frequencies.
- In 1933, the **International Special Committee on Radio Interference (CISPR)** was created to address emerging concerns over EMI.

Key Points

- **Metal Mesh Structure:**

- The scientists have developed a **copper metal mesh on polyethylene terephthalate (PET) sheet**, instead of continuous film, which exhibits a **visible transmittance** of about 85%.

Transmittance describes how much light passes through a sample. In other words, it is light that is not absorbed, scattered, or reflected. It is usually measured in percentage.

- The **metal mesh networks on the substrate are more transparent than continuous film** because it covers only 7% area of the substrate, unlike 100% coverage of continuous film.
- Metal mesh provides **better electromagnetic shielding** compared to the same thickness of continuous metal film where transparency can be compromised.

- **Benefits:**

- The main purpose of the EMI shield is to **isolate a device's energy** so it doesn't affect anything else and **blocks external energy** from getting in.

Without shielding, electronics wouldn't function as designed or may even stop working altogether.

- This 'invisible' shield can be **used in various military stealth applications** and can cover electromagnetic wave emitter or absorber devices without compromising aesthetics.

Besides the physical shape, reducing the electromagnetic signature, which includes radar waves and radio signals, is an important element for enhancing the stealth capability of a weapon platform.

Source: PIB