Novel Photodetector

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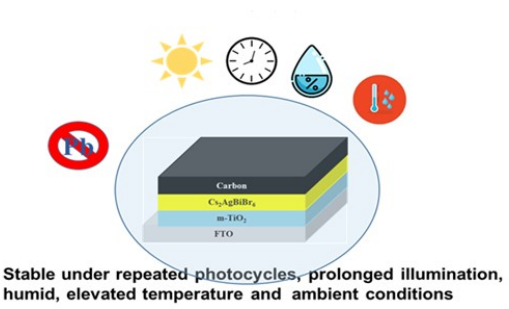
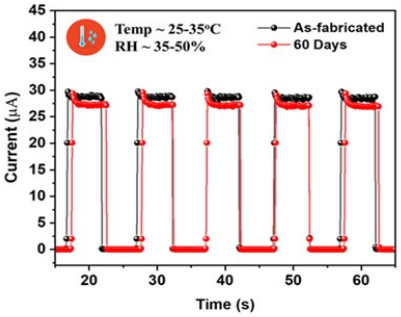
Why in News?

Recently, Indian researchers have developed a novel lead-free, eco-friendly photodetector, offering a sustainable alternative to conventional toxic lead-based photodetectors.

- Photodetectors are ***sensors that can convert the photon energy of light into an electrical signal.***
- **Developed by –** International Advanced Research Centre for Powder Metallurgy and New Materials (ARCI), Hyderabad
- In collaboration with IIT Hyderabad.
- **Nodal Authority –** ***Department of Science and Technology (DST),*** Government of India.
- **Components – Material –** It is based on the double perovskite $Cs_2AgBiBr_6$ that delivers strong and stable performance.
- **Electrodes –** Low-cost carbon electrodes.
- **Design –** Hole Transport Material (HTM)-free, fabricated at room temperature via a one-step coating method.
- **Key Features – Eco-Friendly –** The novel Photodetector is *lead-free* and environmentally friendly.
- **Sensitive –** It exhibits a strong response to visible light.
- **Self-Powered –** Efficient charge separation enables self-powered operation without external voltage.
- **Long-term stability –** ***Retains >90% performance after 60 days.***
- **Fabrication** – Made using a one-step coating at room temperature under normal conditions, reducing cost and complexity.
- **HTM-Free –** Works without protective layers, so no expensive vacuum or glovebox is required.
- **Applications –**
  - Consumer electronics (cameras, smart wearables).

    - Industrial monitoring.
    - Security systems.
    - Biomedical imaging.
- **Benefits –** Reduces toxicity associated with lead-based photodetectors.
- Low-cost and energy-efficient due to self-powered operation.
- Durable under real-world environmental conditions.
- **Significance –** Supports *India's goals of green manufacturing, sustainable materials, and self-reliance* in next-generation electronics.





References

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