



Au-Si Interface Photodetector

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Why in News

Recently, scientists from the **Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR)** have fabricated a **wafer-scale photodetector** (thin slice-based) device, using **gold-silicon interface**.

JNCASR is an **autonomous institute** under the Department of Science and Technology (DST).

Key Points

- The scientists have fabricated **gold (Au)-silicon (n-Si)** interface, which shows **high sensitivity towards light** demonstrating the **photodetection** action.
 - The Au-Si interface was brought about by **galvanic deposition** (a **technique for electroplating of metals**) wherein **water-based solutions (electrolytes)** are used, which contain the metals to be deposited as ions.
 - A **nanostructured Au film** was deposited on top of **p-type silicide** (compound that has **silicon with more electropositive elements**), which acts as a **charge collector**.
- The metal nanostructures **enhance the performance** of the fabricated detector through **trapping the incoming light**.
- The detector exhibits a **rapid response of 40 microseconds** and can **detect low light intensities**.
- The device **covers a broad spectral range** from **Ultraviolet to Infrared** and shows excellent uniformity throughout the entire active area with less than 5% variation in response.

- **Photodetectors:**
 - These are an important part of an **optoelectronic circuit** that can **detect light**.
 - These are employed for a wide variety of **applications** like:
 - Controlling automatic lighting in supermarkets.
 - Detecting radiation from the outer galaxy.
 - Being used in security-related applications.
 - However, **due to high material cost** and the **intricate fabrication processes**, photodetectors become **unaffordable for daily applications**.

Advantages of Au-Si interface Photodetector

- **Quick & Simple:** The process of fabricating a detector takes only a few minutes, making it a quick and simple process.
- **Cost-effective:** Being a **solution-based technique**, the method is highly economical and enables large-area fabrication without compromising the detector response.
- **Highly Capable:** The device can help **detect weak scattered** light as an indication of unwanted activity.
- **Energy Efficient:** The **detector operates in self-powered mode**, which means the device does not require external power for its operation.
- **Environmentally Stable:** With a **commonly available protective coating**, the device shows a long-term environmental stability, under harsh conditions.
- **Multiple Usage:** It can also be used as a **prototype imaging system, lux and power meter** and as a tool for **security applications**.

Source: PIB