Ultra-sensitive wearable ammonia sensor

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Why in News?

Recently, scientists at the CeNS, Bengaluru, an autonomous institute under the Department of Science and Technology (DST), have developed an advanced ammonia sensor.

- **Developed by –** Centre for Nano and Soft Matter Sciences
- **Function –** Capable of detecting toxic gas at extremely low concentrations.
- **Sensor Design –** Hybrid vanadium oxide–vanadium sulfide (VOx/VS_2) heterostructure, engineered via controlled surface transformation.
- **Performance –**
  - Detects ammonia as low as 319 parts per billion (ppb), well below occupational safety limits.
  - Excellent selectivity against other common gases.
  - Stable performance over repeated cycles.
  - Long-term reliability (>10 weeks).
  - Effective across wide concentration ranges.
- **Industrial Relevance –** Ammonia widely used in fertiliser manufacturing, refrigeration, chemical production, and agriculture.
- **Health Risks –** Exposure causes severe irritation to eyes, skin, respiratory system; prolonged exposure leads to serious complications.
- **Energy Efficiency –** Operates at room temperature, unlike conventional sensors requiring high temperatures.

Prototypes

- **Portable Monitoring Device –** ***Threshold-triggered system***, auto-classifies ammonia levels as *safe, warning, danger zones* to respond quickly without technical expertise.
- Designed for *industrial plants, storage facilities, laboratories and*

agricultural settings where ammonia leakage risk is high.

- **Self-Powered Sensor –** sensing platform with a flexible piezoelectric nanogenerator; harvests energy from human movements.
- **Wearable Versions –** Fabricated on polymer, paper, textile substrates; lightweight, flexible, retain sensing capability even when bent or folded.
- **Smart Applications –** Prototype smart bands, smart-home warning systems, electronic textiles for personal safety and intelligent environmental sensing.

Reference

DD News | Ammonia Sensor