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Soft Robotic Actuators

Indian scientists have developed soft robotic actuators with enhanced photomechanical capacity, using highly Porous Carbon Nanoparticles (PCN) from waste onion peels.

- Soft robotic Actuators consisting of rubber-like polymer with embedded nanomaterials can act as efficient traps for the illuminating low-power near-infrared (NIR) light.
- [Actuation is the state or condition of being impelled or moved to action]
- Actuators can convert the control signal (source of energy) into mechanical motion with bioengineering applications.
- Generation of predesigned motion is facilitated by their flexibility, affordability, and easy customization.
- High thermal conductivity of the nanoforms results in rapid distribution of the heat generated locally by thermal and photo-thermal stimuli.
- Specific surface area of PCNs were efficient traps for the illuminating NIR light resulting in the film comprising PCNs and PDMS achieving large magnitude (multi-mm) actuation with sub-second responses.
- With an additional ultrathin (30 nm) gold layer, the magnitude of actuation could be more than doubled, and bidirectional photo-controlled face-sensitive movement realized.
- **Applications** - Actuators can be used for bio-medical applications (drug delivery, wearable and assistive devices, prostheses and artificial organs), military, and remote space operations.

Achievements under National AIDS Control Programme (NACP)

- As a result of sustained efforts being made under the NACP-IV and its extension phase (2012-21), HIV in India continues to be low nationally, with an estimated adult (15-49 yrs.) prevalence of 0.22% in 2020.
- Estimated annual new HIV infections in India have declined by 48% (2010-2020) in comparison to the global average of 31%.
- Estimated annual AIDS-related mortalities have declined by 82% (2010- 2020) in comparison to the global average of 42%.

National AIDS Control Programme

- Launched in 1992, NACP is being implemented as a comprehensive programme for prevention and control of HIV/ AIDS in India.
- Over time, the focus has shifted from a national response to a more decentralized response and to increasing involvement of NGOs and networks of People living with HIV (PLHIV).
- NACP I (1992) had an objective of slowing down the spread of HIV infections to reduce morbidity, mortality and impact of AIDS in India.
- NACP II (1999) aimed to reduce the spread of HIV infection in India, and to increase India's capacity to respond to AIDS on a long-term basis.

- NACP III (2007) was launched with the goal of Halting and Reversing the Epidemic over its 5-year period.

National AIDS Control Programme - IV

- Launched in 2012, NACP IV aims to accelerate the process of reversal and further strengthen the epidemic response in India through a cautious and well defined integration process over 5 years period.
- Objectives of NACP - IV
    a. Reduce new infections by 50% (2007 Baseline of NACP III)
    b. Provide comprehensive care and support to all persons living with HIV/AIDS and treatment services for all those who require it.
- **Key strategies** - Intensifying and consolidating prevention services, with a focus on High Risk Groups (HRGs) and vulnerable population.
- Expanding Information Education and Communication (IEC) services for general population and HRGs with a focus on behaviour change and demand generation.
- Targeted Prevention Interventions for HRGs and Bridge Population (Female Sex Workers, Men who have Sex with Men, Transgenders/ Hijras, Injecting Drug Users (IDU), Truckers & Migrants)
- Needle-Syringe Exchange Programme (NSEP) and Opioid Substitution Therapy (OST) for IDUs

Janani Suraksha Yojana (JSY)

JSY has made significant impact in last one decade by increasing institutional delivery from 38.7% in NHFS-3 to 78.9% in NFHS-4.

- It was launched in 2005 by modifying the National Maternity Benefit Scheme (NMBS), a component of National Social Assistance Program.
- JSY is a safe motherhood intervention under the National Rural Health Mission (NHM).
- This 100 % centrally sponsored scheme is implemented by the Department of Health & Family Welfare in all states and UTs, with a special focus on Low Performing States (LPS).
- **Objective** - Reducing maternal and infant mortality by promoting institutional delivery among pregnant women.
- It integrates cash assistance with delivery and post-delivery care.
- **Target Group** - The scheme focuses on poor pregnant woman with a special dispensation for states that have low institutional delivery rates.
- States with low institutional delivery rates - Uttar Pradesh, Uttarakhand, Bihar, Jharkhand, Madhya Pradesh, Chhattisgarh, Assam, Rajasthan, Orissa, and Jammu and Kashmir.
- While these states have been named Low Performing States (LPS), the remaining states have been named High Performing states (HPS).
- The scheme provides performance based incentives to women health volunteers or Accredited Social Health Activists (ASHAs) for promoting institutional delivery among pregnant women.
- **Benefits** - Cash assistance is given for both the institutional delivery and home delivery.
    - Institutional delivery - In both LPS & HPS, BPL/SC/ST women are entitled for cash assistance in accredited private institutions.
    - Home delivery - BPL pregnant women, who prefer to deliver at home, are entitled to a cash assistance of Rs. 500 per delivery regardless of the age of pregnant women and number of children.
- Eligible mothers get JSY benefit regardless of any age and number of children. They get benefit directly into their bank accounts.

E-Prisons Project

- The e-Prisons have been operationalised in all States and Union Territories.
- E-Prisons Project, which aims at computerization of the functioning of prisons in the country, is assisted financially by the Home Ministry.
- e-Prisons data has been integrated with Police and Court system under the Inter-operable Criminal Justice System (ICJS).
- **3 components of the e-Prisons Project**
    1. e-Prison Management Information System (MIS) is used at the prisons for their day to day regular activities.
    2. National Prisons Information Portal (NPIP) is a citizen centric portal maintained by States and UTs. It shows statistical data of various prisons in the country.
        - It can be accessed through NIC network, exclusively by authorized officials of Law Enforcement Agencies and Prisons, through ICJS.
    3. Kara Bazaar Portal showcases and sells the products manufactured in various prisons of the country by inmates.

Inter-operable Criminal Justice System

- It is a common platform for information exchange and analytics of all the pillars of criminal justice system - Police, Forensics, Prosecution, Courts, Prisons, etc.
- It aims to reduce errors and time taken in sharing of the information.
- Invested under the Crime and Criminal Tracking Network & Systems (CCTNS) project of the MHA, the ICJS enables a nationwide search on police, prisons & courts databases across all States/ UTs in India.

Emission Control Measures By Thermal Plants

- In 2020, the Government of India made rules for use of coal by thermal power plants, without stipulations of ash content or distance.
- **Technology Solution for emission norms** - Compliance of specified emission norms for Particulate Matter, as per the notifications of Central Pollution Control Board, issued from time to time.
- In case of washeries, Middling and rejects to be utilized in Fluidised Bed Combustion (FBC) technology based thermal power plants.
- **Ash Ponds** - Thermal plants must comply with the Fly Ash notification, without being entitled to extra power generation capacity of fly ash pond on ground of switching from washed to unwashed coal.
- Segregation of ash may be done at the Electro-Static Precipitator stage to ensure maximum utilization of fly ash.
- **Coal Transportation** may be undertaken by Railway wagon (covered by tarpaulin or other means) or covered conveyer beyond the mine area.
- However, road transportation may be undertaken in covered trucks, if Rail transport/conveyer infrastructure is not available.
- With advancement in pollution control technologies, thermal plants are better equipped to capture fly-ash generated in combustion process and unwashed coal can be used more efficiently and economically.

Fluidised Bed Combustion Technology

- It is a combustion technology used to **burn solid fuels** (types of coal, coal waste and woody

biomass) at high efficiency and without the necessity for expensive fuel preparation.

- Fuel particles are suspended in a hot, bubbling fluidity bed of ash and other particulate materials (sand, limestone etc).
- Through this suspension, jets of air are blown to provide the oxygen required for combustion or gasification.
- The resultant fast and intimate mixing of gas and solids promotes rapid heat transfer and chemical reactions within the bed.
- For any given thermal duty, FBCs are smaller than the conventional furnace, so they offer advantages in terms of cost and flexibility.
- **Reduced Emissions** - FBC reduces the amount of SOx, NOx emitted.

Other Options

Various technology options for regulating the emission standards in coal-fired power plants include,

1. Flue Gas Desulfurization System,
2. Spray Dryer Absorber (SDA),
3. Circulating Dry Scrubber (CDS),
4. Limestone-based Wet FGD,
5. Selective Non Catalytic Reduction,
6. Electrostatic Precipitator,
7. Bag House Dust Collector.

Source: PIB, The Hindu, The Indian Express