

What are lab-grown diamonds?

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In news— During her Budget speech(2023), Finance Minister Nirmala Sitharaman announced the **government's move to focus on lab-grown diamonds.**

About Lab-Grown Diamonds(LGDs)-

- Lab-grown diamonds are **diamonds that are produced using specific technology which mimics the geological processes that grow natural diamonds.**
- They are **not the same as “diamond simulants”** – LGDs are **chemically, physically and optically diamond** and thus are **difficult to identify as “lab-grown.”**
- While materials such as **Moissanite, Cubic Zirconia (CZ), White Sapphire, YAG, etc.** are **“diamond simulants”** that simply attempt to “look” like a diamond, **they lack the sparkle and durability of a diamond** and are thus easily identifiable.
- However, differentiating between an LGD and an Earth Mined Diamond is hard, with advanced equipment required for the purpose.
- **There are multiple ways in which LGDs can be produced.** The **most common (and cheapest) is the “High pressure, high temperature” (HPHT) method.**
- As the name suggests, this method requires **extremely heavy presses that can produce up to 730,000 psi** of pressure under extremely high temperatures (at least 1500 celsius).
- **Usually graphite is used as the “diamond seed”** and when subjected to these extreme conditions, the relatively inexpensive form of carbon turns into one of the most expensive carbon forms.
- **Other processes include “Chemical Vapor Deposition” (CVD) and explosive formation that creates what are known as “detonation nanodiamonds”.**

Uses of LGDs-

- **LGDs have basic properties similar to natural diamonds, including their optical dispersion,** which provide them the signature diamond sheen.
- However, since they are created in controlled environments, many of their properties can be enhanced for various purposes.
- For instance, **LGDs are most often used for industrial purposes, in machines and tools.** Their hardness and extra strength make them ideal for use as cutters.
- Furthermore, **pure synthetic diamonds have high thermal conductivity, but negligible electrical conductivity.** This combination is invaluable for electronics where such diamonds **can be used as a heat spreader for high-power laser diodes,** laser arrays and high-power transistors.
- Lastly, as the Earth's reserves of natural diamonds are depleted, **LGDs are slowly replacing the prized gemstone in the jewelry industry.**
- Crucially, like natural diamonds, LGDs undergo similar processes of polishing and cutting that are required to provide diamonds their characteristic lustre.
- Thus, growth in the production of LGDs is unlikely to affect India's established diamond industry which undertakes these tasks.

New announcements-

- Finance Minister has announced that customs duty on the seeds used in lab-grown diamond manufacturing will be reduced.
- She also announced a grant to IITs to facilitate the growth of LGDs in India.