

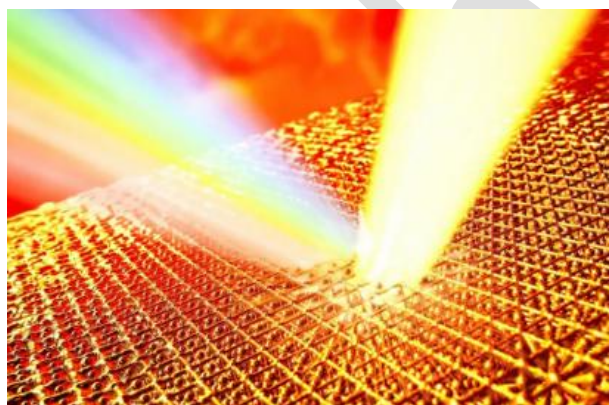
## Current Affairs 29<sup>th</sup> July 2025 by Right IAS

### New Nature study on superheating gold

#### What Did Scientists Discover?

Scientists found that gold can stay solid even when heated to 14 times its normal melting point, if it is heated very quickly. This challenges a long-held belief that solids must melt at a certain high temperature due to disorder in their atoms.

**Important Concepts** 1. **Superheating:** Normally, solids melt when they reach their melting point. But sometimes, if heated under special conditions, a solid can stay solid even above its melting point. This is called superheating.



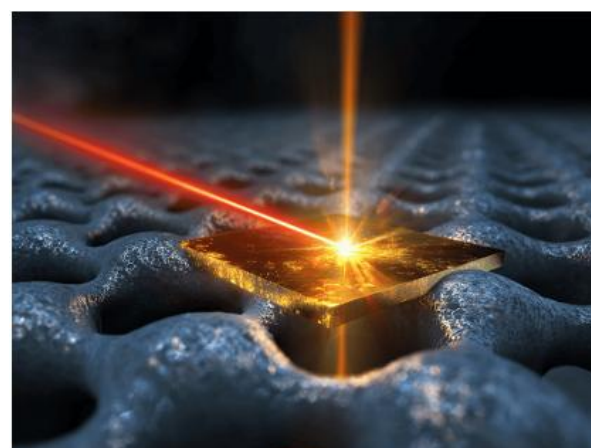
**Entropy Catastrophe (TEC):** In 1988, scientists Hans-Jörg Fecht and William Johnson proposed that a solid can't be heated more than about 3 times its melting point. If it is, the solid becomes more disordered (has more entropy) than its liquid form. This would break the second law of thermodynamics, which says entropy (disorder) should not decrease in an isolated system. That critical

temperature was called the TEC – Temperature of Entropy Catastrophe



#### What Did the New Study Do?

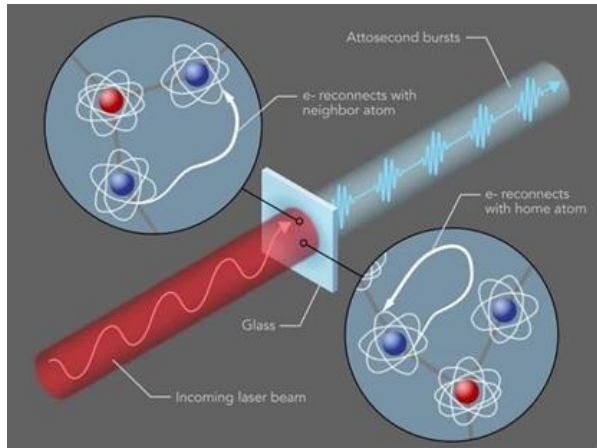
Researchers from Germany, Italy, the UK, and the US used ultrafast laser pulses to heat very thin gold films (50 nanometres thick). These laser pulses heated the gold in just trillionths of a second, so fast that the atoms couldn't react or move into a liquid state. Right after heating, X-rays were used to check the arrangement of atoms.



#### What Did They Find?

The gold stayed solid even at a temperature 14 times higher than its usual melting point. The X-ray patterns showed that the atoms were still arranged in a solid

crystalline structure. This solid state lasted for a few picoseconds (trillionths of a second), which is long in the world of atoms.



### Why Is This Important?

It questions the idea that the "entropy catastrophe" is unavoidable. Shows that if a material is heated fast enough, it might not melt, even at extreme temperatures. This is useful for building materials for extreme environments like: Planets with intense atmospheres High-temperature machinery Space technology Conclusion Fast heating changes the rules: Gold can remain solid far beyond its expected melting point if heated faster than the atoms can rearrange. This discovery opens up new possibilities in material science and challenges previous thermodynamic limits.

### The Hindu

#### Prime Minister Narendra Modi's visit to Tamil Nadu and the legacy of the Chola dynasty

Context of PM Modi's Visit PM Narendra Modi visited Gangaikonda Cholapuram, Tamil Nadu. The visit marked the birth anniversary of Rajendra Chola I and the valediction of the Aadi Thiruvathirai

festival. It also commemorated: 1,000 years of Rajendra Chola's maritime expedition to Southeast Asia, and The construction of the Gangaikonda Cholapuram temple, a UNESCO World Heritage Site.



Political and Symbolic Message PM Modi highlighted the Chola legacy to convey that modern India can be as ambitious and sovereign as ancient India under the Cholas. The celebration carried a subtle political message, connecting India's past grandeur with its present aspirations.

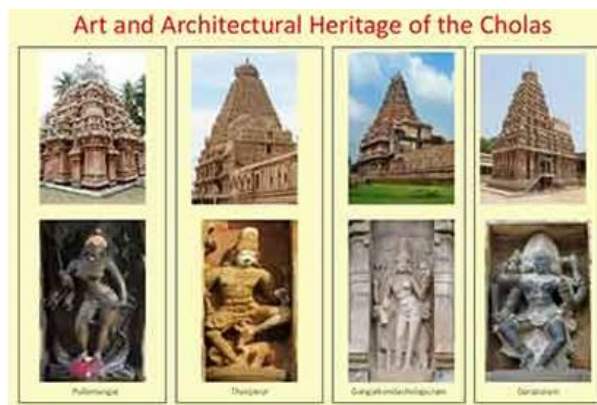


Chola Contributions and Contemporary Relevance 1. Architecture and Structural Engineering Chola temples, like the Brihadisvara temples, have survived over 1,000 years, showing remarkable structural



resilience. Despite earthquakes in southern India over the past 200 years, these temples remain intact. Their seismic-resistant design can offer insights for modern infrastructure and building safety, especially in light of recent civic accidents.

**Water Resource Management :** The Cholas were skilled in managing water systems, especially in the Cauvery delta. Today, this region experiences floods and water wastage, which could be mitigated by learning from Chola-era systems.



**Administrative Acumen** The Chola dynasty developed sophisticated systems for: Taxation Land revenue collection Village-level governance These systems offer lessons for improving modern public administration and local self-governance.



**Democratic Practices and Local Governance** The Cholas promoted grassroots democratic practices, including local bodies (sabhas). In contrast, many urban and rural local bodies in India today lack elected representatives, even after 30+ years of the 73rd and 74th Constitutional Amendments. The celebration is a chance to reflect on and improve local governance.



**Cultural Symbolism and Historical Consciousness** PM Modi announced plans to install statues of Rajaraja Chola and Rajendra Chola. The statues aim to revive national pride and historical awareness. But the true value lies in drawing attention to their governance practices, not just celebrating their military or architectural feats.



**Conclusion** Honouring the Cholas is not only about celebrating heritage, but also about learning from their administrative and engineering strengths. Their legacy can inspire better governance, infrastructure resilience, and local democracy in today's India



Antitrust issues in India's digital economy, the Sherman Act legacy, and start-up challenges:

**Background: The Sherman Act and Its Legacy** In 1890, U.S. Senator John Sherman argued against monopolistic control over essentials like production and trade. His Sherman Act became the first major antitrust law, influencing global market regulation — including India's competition framework. His core idea: No monopolies ("kings") in a free economy, whether in politics or business.



Digital Economy and Evolving Challenges In the 21st century, "necessities of life" include digital services and platforms. India's digital economy contributed 11.74% to its GDP (2022–23). Technology start-ups in India rose from 2,000 (2014) to over 31,000 (2023). The Indian government relies on this momentum to build a \$35 trillion 'Viksit Bharat' by 2047.



**Modern Monopolies and Gatekeeping** Unlike in Sherman's time, today's monopolies are global digital giants, many based outside India. These companies dominate: Digital distribution Advertising Mobile ecosystems This creates challenges for Indian start-ups, limiting their growth and market access.





**Google's Dominance in Focus** Google controls 95% of India's mobile OS market (Android). Most app visibility, installation, and monetisation in India depends on Google's ecosystem: Google Play Store Google Search Google Ads High commissions and advertising restrictions by Google impact start-up revenues.



**Gaming Industry Complaint Against Google** An Indian gaming company filed a complaint with the Competition Commission of India (CCI). Allegation: Google's Real Money Gaming (RMG) Pilot Program was discriminatory. Only DFS (Daily Fantasy Sports) and rummy were allowed in the Pilot. Other gaming formats were excluded from Play Store visibility. DFS operator gained 55 million users in 1 year post-Pilot access — showing massive

market advantage. Advertising rules were also changed to favour only DFS and rummy, cutting off other game types. One start-up saw a loss of over 68% in downloads after ad restrictions.



**Role of the Competition Commission of India (CCI)** CCI has prevented Google from: Forcing developers to use only Google Pay. Blocking third-party communication. The new gaming complaint adds to the ongoing investigations into Google's anti-competitive behaviour.



**Economic Consequences for India Market** distortions from such dominance lead to: Less competition Reduced innovation Poorer quality and fewer choices for consumers Over-dependence on global players This weakens India's ability to reach its digital economy goals. In the U.S.,

similar monopolies have led to: Rising business costs Fall in Initial Public Offerings (IPOs) Decline in entrepreneurial activity

### **What Should Be Done?**

India needs to democratise digital access, especially in app distribution and monetisation. Global firms should support — not suppress India's start-up innovation. The gaming company's case reflects Sherman's original concern: economic kings stifling fair opportunity. A balanced digital regulatory framework is essential for Digital India's future.

