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New Technique to Produce Hydrogen

Scientists at the University of California Santa have developed a new method to efficiently generate hydrogen from water at ambient temperatures using post-consumer aluminium and gallium.

- **Aluminium** - As Aluminium is a highly reactive metal, aluminium nanoparticles can easily reacts with the oxygen molecules in water to release hydrogen gas.
- However, the pure form of the metal is so reactive that it instantly reacts with air to create a coating of aluminium oxide (alumina) on its surface.
- This means that the metal cannot react with water. That is where gallium comes in.
- **Gallium** - Gallium is liquid at slightly above room temperature and it removes the alumina coating that forms on aluminium.
- This allows aluminium to be in direct contact with the water and react with it.
- The researchers found that a **3:1 ratio** of gallium and aluminium in the composite was the optimum ratio for the highest hydrogen production.
- The Alumina that is formed have many applications including in spark plugs, abrasion-resistant tiles and cutting tools.
- **Significance** - The worldwide push for electric vehicles has largely focused on battery electric vehicles (BEVs), which typically use lithium-ion batteries to store electricity in order to propel the vehicle.
- An alternate technology involves the use of “hydrogen fuel cells” to generate electricity from hydrogen and use that to power the vehicle.
- Hydrogen fuel cell vehicles present some advantages over BEVs - they can be refuelled with hydrogen as fast as a conventional vehicle can be refilled with fossil fuels.
- In addition, they reduce dependence on minerals like lithium and cobalt, which are used to produce lithium-ion batteries.
- Therefore, this new technology for producing hydrogen can be used to scale up to produce hydrogen in commercial quantities.

Reference

1. <https://indianexpress.com/article/technology/science/scientists-develop-simple-technology-to-produce-hydrogen-gas-at-room-temperature-8147006/>
2. <https://www.sciencealert.com/clean-fuel-breakthrough-turns-water-into-hydrogen-at-room-temperature>
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i-Banks

Large i-banks are getting picky about initial public offerings (IPOs). So, smaller i-banks join the big-fat IPO party.

Investment banking is a special segment of banking operation that helps individuals or organisations raise capital and provide financial consultancy services to them.

- Investment bank (i-bank) is a financial services company that acts as an **intermediary in large and complex financial transactions**.
- This bank is usually involved,
 1. When a startup company prepares for its launch of an IPO and
 2. When a corporation merges with a competitor.
- It offers storefront community banking and also caters to the investment needs of high-net-worth individuals.

Global investment banks include JPMorgan Chase, Goldman Sachs, Morgan Stanley, Citigroup, Bank of America, Credit Suisse, and Deutsche Bank.

- **Working** - Advisory division of an i-bank is paid a fee for its services.
- Trading division earns commissions based on its market performance.
- Retail banking divisions make money by loaning money to consumers and businesses.
- Professionals who work for investment banks may have careers as financial advisors, traders, or salespeople.
- Investment banks are best known for their work as **intermediaries between a corporation and the financial markets**.
- That is, they help corporations issue shares of stock in an IPO or an additional stock offering.
- They also arrange debt financing for corporations by finding large-scale investors for corporate bonds.

A 'Chinese wall' is supposed to separate investment banking activities from the company's trading division to prevent conflicts of interest.

Reference

1. https://www.business-standard.com/article/markets/large-i-banks-turn-picky-as-ipo-aspirants-surge-let-go-of-smaller-issues-122091201183_html
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Electric Highways

The Union Ministry of Road Transport and Highways is working on developing electric highways.

- An electric highway generally refers to a road that supplies power to vehicles travelling on it, including through overhead power lines.
- The electric highways that will be developed by the Indian government will be **powered by solar energy**, which will facilitate the charging of heavy-duty trucks and buses while running.

Around 3 crore trees would be planted across the national highways. The government is formulating a new policy called Tree Bank for tree cutting and plantation.

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3. <https://www.hindustantimes.com/car-bike/centre-to-build-solar-powered-electric-highways-says-nitin-gadkari-101663040523321.html>

Index Funds

- An index fund is a type of **mutual fund** or exchange-traded fund (**ETF**) with a portfolio constructed to match or track the components of a financial market index, such as the S&P's 500 Index.
- An index fund is a portfolio of stocks or bonds designed to mimic the composition, returns, and performance of a financial market index.
- For example, a Nifty 50 Index Fund will replicate the Nifty50 index.
- **Benefits** -An index mutual fund is said to provide broad market exposure, low operating expenses, and low portfolio turnover.
- These funds follow their benchmark index regardless of the state of the markets.
- Index funds follow a passive investment strategy.

Index funds seek to match the risk and return of the market based on the theory that in the long term, the market will outperform any single investment.

- **Measuring Market index** - A market index measures the performance of a "basket" of securities (like stocks or bonds), which is meant to represent a sector of a stock market, or of an economy.
- You cannot invest directly in a market index, but because index funds track a market index they provide an **indirect investment option**.

Reference

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2. <https://www.investopedia.com/terms/i/indexfund.asp>
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AT-1 Bonds

Two years after the YES Bank fiasco, Additional tier-1 (AT1) bonds are once again gaining popularity.

After the YES Bank fiasco, the Securities and Exchange Board of India curtailed retail participation by increasing their face value to ~1 crore.

- Additional Tier-1 bonds (AT-1 bonds) are a type of unsecured **perpetual debt instrument**.

- They are used by the banks to augment their core equity base and thus comply with Basel III norms.
- AT-1 includes perpetual non-cumulative preference shares and perpetual bonds.

AT-1 bonds were introduced by the Basel accord after the global financial crisis to protect depositors.

- **Features of the AT1 bonds** - AT-1 bonds are **perpetual** in nature - they do not carry any maturity date.
- They offer **higher returns** to investors but compared with other vanilla debt products, these instruments carry a higher risk as well.
- If the capital ratios of the issuer fall below a certain percentage or in the event of an institutional failure, the rules of the RBI allow the issuer to **stop paying interest or even write down** these bonds.
- These bonds are **subordinate to all other debt** and senior only to equity.
- **Quasi-equity feature** - To lend more, banks need to shore up their equity capital. However, issuing additional equity would dilute the bank's return on equity.
- Instead, the banks issue AT1 bonds, which they can treat as equity for calculating their tier 1 capital.

Risks involved with AT1 Bonds

- Key risk of AT1 bonds arises from its '**loss absorption**' feature.
- When a bank is being restructured or liquidated, the order of repayment is as follows: FD holders, secured debt, unsecured or subordinate debt, and perpetual debt (AT1 bond) holders.
- The AT1 bonds rank last in repayment - just before equity - that makes them the riskiest among fixed-income securities.
- This risk reduces in the case of banks having stronger fundamentals.

Compared to the normal bonds of the same bank, AT1 bonds would be riskier, which is why they offer a higher rate of return.

- Another risk arises from '**coupon discretion**'.
- In the case of AT1 bonds, the payment of the coupon depends on whether the bank has profits. It can also dip into its reserves to pay coupons.
- In normal bonds and debentures, payment of coupon is not contingent on whether the issuer is in profit or loss.
- Non-payment of coupon has not happened to date in AT1 bonds, but the risk exists.
- **Call option Risk** - As AT1 bonds do not have a maturity date, the banks have a call option that permits them to redeem these bonds after a certain period.
- The issuer bank can recall them after five years (or subsequently on the anniversary of issuance).
- If the bank exercises its call option when interest rates are going down, that subjects the investor to reinvestment risk.

Reference

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