sequel

Sequel Request for Startups: Thesis Drop #002

POST-SILICON ERA

NEW MATERIALS, NEW CIVILISATION

Every civilisation has been defined not by its rulers or its borders, but by its materials. Stone gave us tools, bronze agriculture and empires, steel industry and cities, silicon chips and a networked world - collapsing distance and placing human knowledge in the palm of a hand.

Each age ended the same way: materials hit their limits. Stone was too brittle, bronze collapsed with trade, steel is chained to carbon, silicon is nearing the wall of physics. But the tempo has quickened: the Stone Age lasted 3 million years, the Bronze Age 2,000, the Age of Steel just a few centuries, and the silicon era less than 80.

The pattern is unmistakable: new materials don't just make better tools - they remake civilisation.

Stone enabled survival. Bronze enabled states. Steel enabled empires. Silicon enabled networks. Now we stand on the threshold of the next epoch.

The limits of Matter

The materials that powered the 20th century are running out of headroom.

Steel & Cement

Together, they account for ~14% of global emissions. These are the hard limits of sustainable urbanisation.

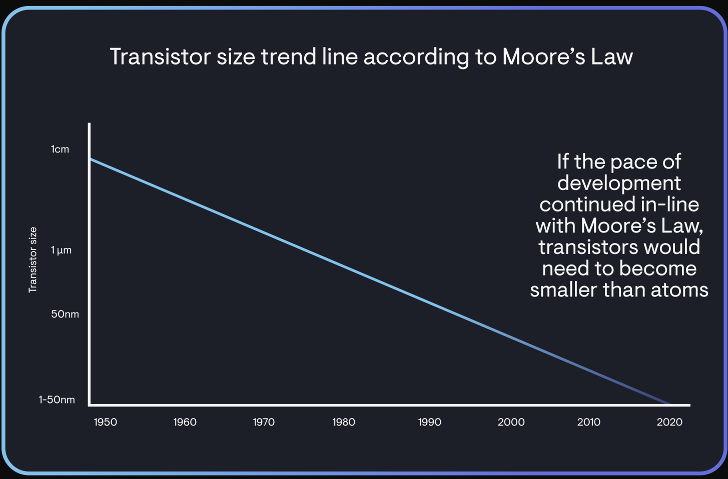
Plastics

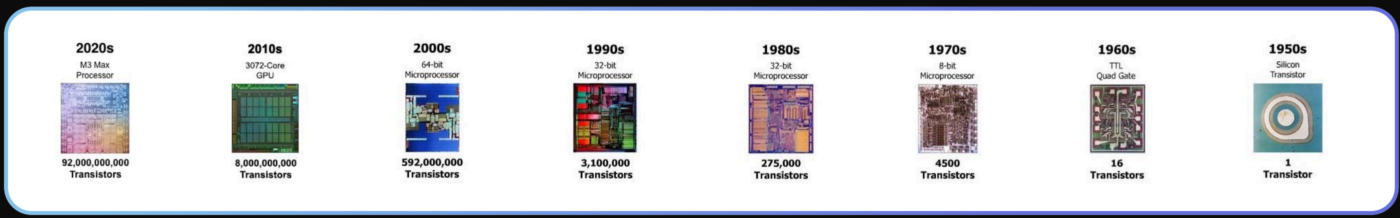
Over 400 million tons are produced annually, <10% recycled. They are now choking ecosystems worldwide.

Silicon

Since the 1960s, the number of transistors on a chip has doubled roughly every two years, in line with "Moore's Law."

This was achieved through breakthroughs in chip fabrication - using ever-finer lithography, such as extreme ultraviolet light, to etch microscopic transistors into silicon. But Moore's Law is flattening: by the 2030s, transistor miniaturisation will collide with atomic limits, while the energy footprint of fabrication is already exploding. The energy footprint of fabrication is already exploding





These limits are not technical footnotes - they are civilisational bottlenecks. Energy grids, urban infrastructure, consumer products, and defense capabilities are all constrained not by ideas, but by matter.

Nowhere is this clearer than in artificial intelligence. The performance of today's frontier AI models is bound less by algorithms than by materials. Training GPT-scale systems requires millions of GPUs, each built on silicon approaching its physical ceiling. Data centers now consume over 2% of global electricity, and projections suggest AI could drive that share to 10% by 2030.

Cooling systems, server racks, and fabrication plants are stretching the limits of what silicon, copper, and concrete can deliver.

The paradox of our age: we have infinite leverage in software and networks, yet our physical systems are gridlocked by outdated materials. Software ate the world - but it cannot eat the laws of physics. If AI is to continue its trajectory, it will not be because of cleverer code, but because new materials unlock new substrates of computation, energy storage, and cooling.

The Unlocks of New Materials

AI Acceleration in Materials Discovery

The traditional materials discovery process - taking 30+ years from discovery to commercialization - is being revolutionized by AI. Microsoft and Pacific Northwest National Laboratory screened 32 million materials in just 80 hours, while DeepMind's AlphaFold achieved a 45,000x acceleration in protein structure solving.

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Beyond Nature: The Metamaterial Frontier

For the first time in history, civilisation is not bound by the limits of natural materials. Metamaterials represent the most radical leap: engineered matter that rewrites the laws of physics. Unlike graphene or biodesigned composites, which enhance nature's properties, metamaterials create properties nature never provided.

From creating invisibility cloaks at Duke University, to bending light into superlenses for ultra-resolution imaging or steering radiation into low-loss antennas like Kymeta's flat-panel dishes and Echodyne's radar - metamaterials unlock properties nature never provided and this is only going to accelerate.

Market Winners: The Matter Pioneers

MatNex

AI-powered materials discovery tool that combines first-principles physics and machine learning to accelerate the design of sustainable, high-performance materials.

CuspAI

Raised $100M+ in 2025 from NEA, Temasek, Nvidia, Samsung, and Hyundai. Uses generative AI to design and validate new materials for energy and sustainability.

Periodic Labs

Just launched out of stealth in 2025 with $300M. Building foundation models to accelerate discovery at scale, making material R&D as iterative as software.

But new materials are not endpoints, they are platforms.

Just as silicon enabled computing, networks, and trillion-dollar platforms, the breakthroughs of this century will enable new systems that redefine civilization itself.

Energy: Graphene and solid-state batteries power ultra-efficient storage and superconducting transmission. The energy bottleneck collapses; a post-carbon grid becomes possible.

Construction: Programmable composites and self-healing concrete build adaptive, carbon-negative megacities. Architecture becomes regenerative.

Consumer Products: Smart composites and biodesigned wearables make devices flexible, durable, and ambient. Spatial computing becomes mainstream not through code, but through matter.

Computing: Graphene transistors and quantum substrates power a new wave of spatial, quantum, and bio-computation. The next leap is built not in silicon, but in post-silicon substrates.

Stone made us human. Bronze made us societies. Steel made us empires. Silicon made us networks.

Each age ended when materials reached their limits.

We believe the greatest investment opportunities of the next decade will not be found in code alone, but in matter and what it's going to unlock in the next 5-10 years.

Sources

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