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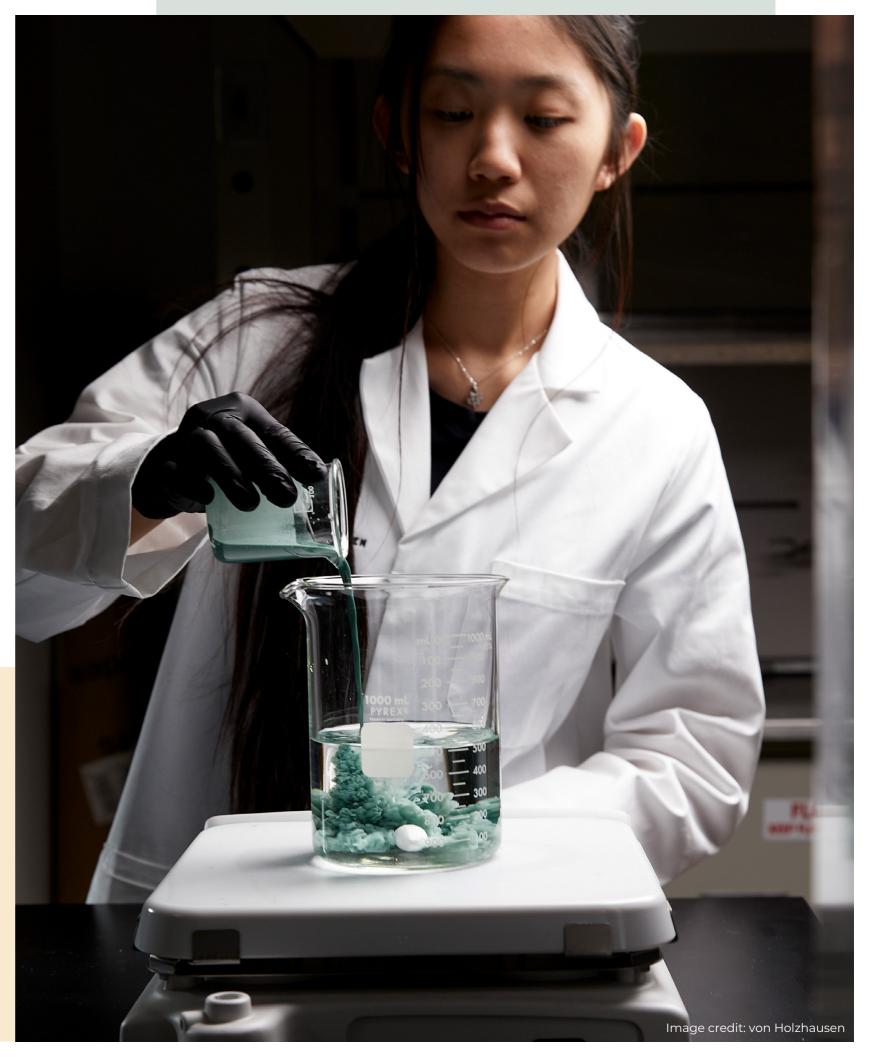
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EXECUTIVE SUMMARY

he next-gen materials industry is a leading-edge, high-growth industry that is capturing the imagination of scientists, designers, and consumers alike. It represents a unique opportunity to slash the biggest environmental impacts of the fashion, automotive and homegoods industries and by-pass animal agriculture's drawbacks with efficient, scalable technologies. In 2023, despite a global backdrop of falling VC investments, the next-gen materials industry had a 10% rise in investments, showing significantly higher investments than the general market. Next-gen materials make up less than 1% of the total market for animal materials and the animal materials industry is at least a \$126 billion market. Since 2020 there have been almost 800 successful collaborations between brands and next-gen material innovation companies. This report serves as a clarion call to investors to channel their resources into this exciting and growing industry.





NEXT-GEN MATERIALS: THE FUTURE OF SUSTAINABLE FASHION, VEHICLES AND HOME GOODS

WHAT ARE NEXT-GEN MATERIALS?

Next-gen materials are innovative alternatives to traditional petrochemical- and animal-based materials like leather, silk, down, fur, and wool. They aim to replace petrochemical- ("current-gen") and animal-based ("incumbent") materials and significantly reduce environmental impacts and animal welfare concerns. Next-gen materials replicate the performance of their animal-based counterparts by using biomimicry approaches while being more sustainable.

Next-gen materials can be made from one of six main "inputs": plant-matter, mycelium, cultivated animal-cells, microbes, recycled materials, or a blended composition of various inputs.



Fu



Down



Silk



Wool



Leather

THE PROBLEM

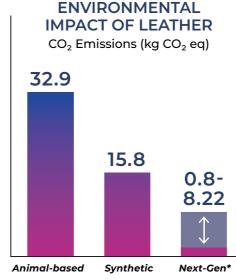
The modern materials industry has severe ethical and environmental impacts, including:

- ▶ High CO₂ emissions, biodiversity loss, and microplastic pollution
 - Widespread forced labor
- The slaughter of trillions of wild and farmed animals every year, many of whom are largely unprotected by welfare laws

THE SOLUTION

Compared to conventional synthetic and animal-derived materials, next-gen materials:

- ▶ Aim for an >80% reduction in Global Warming Potential¹²
 - ► Contain no animals, microplastics, or toxins
- ▶ Restore biodiversity and promote humane agricultural practices
- ▶ Are developed by companies that protect human rights and safety
- ► Foster circular economies for the materials we wear and use every day



*Includes 5 top companies on the market.

FACT:

Next-gen materials, on the whole, are poised to be over 90% better than animal based materials and over 60% better than synthetics.

WANT TO KNOW MORE?

See our Further Insights section at the end of the report for a reading list.



OPPORTUNITY

Consumer Demand

Likely to purchase next-gen materials:





of U.S. consumers surveyed³

of Chinese consumers surveyed⁴

Brand Interest



of brands MII has met with are interested in using next-gen materials.

Market Opportunity

Next gen materials make up less than 1% of the total market for animal materials. The animal materials industry is at least a \$126 billion market. Since 2020, there have been almost 800 partnerships⁵ between next-gen material companies and fashion, automotive, and home goods brands. And with consumers demanding these materials, there is enormous market potential for alternatives.

WHY NEXT-GEN MATERIALS ARE CRITICAL TO BRANDS IN 2024

- 65% of a brand's environmental footprint comes from raw
 materials, highlighting a key area to implement change and meet their sustainability targets.⁶
- Incoming legislation such as the Fashion Act may soon make sustainability targets mandatory.
- Brands also need to respond to consumers who have clearly indicated that they are ready to support this positive change.

Brands' sustainability targets create concrete and predictable opportunities for material innovators. They are also a good reference for innovators and investors to gauge the potential market size and growth rate of the next-gen materials industry.



DRIVERS OF SUSTAINABLE AND ETHICAL TRANSFORMATION

Disruption in Animal Agriculture

The animal agriculture industry is at risk as affordable and efficient alternative proteins and materials gain market share. This shift could drive up prices for traditional products and challenge the industry's viability, potentially accelerating the move away from animal-derived products.

Backlash Against Plastic

Plastic is increasingly unpopular, pushing brands to reduce or replace petroleumbased fibers like polyester and nylon. The growth of next-gen materials is being driven partly by the demand to replace current-gen synthetics.

Ethical Shifts in Animal Welfare

Growing concern for animal welfare has led to an increase in certifications and widespread bans on certain husbandry practices and animal-based materials. These bans have been adopted by brands, fashion shows, and countries alike. As cruelty-free, high-performance and sustainable alternatives become more available, this trend is expected to continue.



Consumers Care About Sustainability

More and more people are concerned about sustainability in their fashion purchases. Consumers, especially Millennials and Gen Z, are expressing desires to purchase more sustainable products. 86% of respondents in a global study believe purchasing clothes made from sustainable materials is crucial for a sustainable lifestyle.⁷

The Relative Lack of Barriers

Effecting large-scale change in the materials industry will be easier than doing so in the meat industry due to a relative lack of barriers concerning consumer acceptance and regulatory hurdles:

- Fashion and automotive brands are willing to switch to next-gen materials once they meet the necessary specifications for their products.
- Consumers are more likely to quickly shift away from animal-derived materials than from animal-based foods, as they have less emotional attachment to materials and are more open to technological innovations in products like clothing and cars.
- The regulatory hurdles are significantly fewer for introducing a new material to market than for a novel food.

INDUSTRY CHALLENGES

Tariff Disparities

Current tariffs create a significant disparity between traditional and next-gen materials, disadvantaging sustainable options. Until tariff reforms occur, next-gen companies can gain competitive advantages by leveraging tax incentives and public funding.89

Labeling Concerns

We expect that producers of animal-based materials will challenge the use of terms like "leather" and "fur" for next-gen materials, but that such labeling laws will ultimately not survive legal challenges.¹⁰

"The rules of the game need to change, so people trying to work responsibly aren't punished. We need taxes on unsustainable materials and incentives for the alternatives."



— Hannes Schoenegger, co-founder and CEO, Bananatex¹¹

Industry Failures

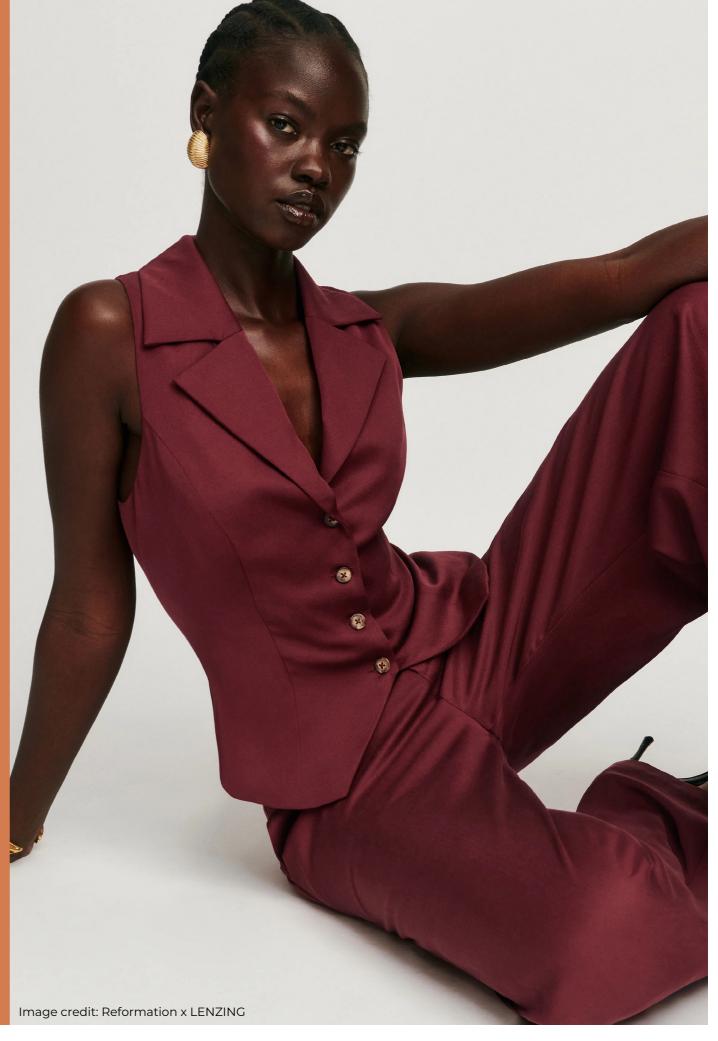
High-profile bankruptcies and production-pauses such as those of Renewcell and Bolt Threads have raised questions over the industry's longevity.¹² ¹³ But such events are normal for emerging technologies where risk-taking pioneers often 'fail-forward' for the greater good. One company's demise does not negate the demand for next-gen materials or the viability of the industry as a whole.14 Per Gartner's Hype Cycle for Emerging Technologies, the next-gen materials industry is likely emerging out of the 'trough of disillusionment' and moving up the 'curve of enlightenment' towards maturity. Setbacks and shake-outs are an expected part of this stage of development.¹⁵

"A lot of the first-movers in this space — who really paved the way in generating interest and demand — have faced challenges. Investors see pilots here and there but they're looking for bigger commitments to prove that brands want this and will do what is necessary to support it."



— **Stephanie Downs**, co-founder and CEO, Uncaged Innovations.¹⁶





IN CONCLUSION

With clear interest from consumers and brands, this industry represents a significant opportunity for financial, environmental, and social return. There is clear demand for next-gen materials, but not enough supply to meet the sustainability, performance, aesthetic, volume, and price needs of brands and consumers. By funding promising startups, investors can change that and advance the material revolution.



Image credit: BEEN London x Arda





INVESTMENT IN THE NEXT-GEN MATERIALS INDUSTRY

- Despite global VC funding falling 42% and deal count falling 30% to reach a 6-year low in 2023, funding for next-gen materials companies increased.¹⁷ The next-gen materials industry enjoyed a 10% rise in investment funding in 2023, showing significantly higher investments than the general market.
- In 2023, just over US\$500 million was raised by the next-gen material companies, from 36 publicly disclosed deals.
- Since 2019, over \$3 billion has been invested in the next-gen materials industry.
 93 new companies have been formed since 2014, putting the current company count at 142+, spread across 5 continents.¹⁸

State of the next-gen material industry at a glance (2023)



Capital invested in next-gen material companies, 2014-2023



*** "Others" includes deal types (i) Secondary Transactions - Private, & (ii) Corporate (Non-control transaction)

Source: MII analysis on investment activities in companies included in MII's company database, based on data from PitchBook and primary research.

See our **2023 State of the Industry Report: Next-Gen Materials** for more on recent investment activity in next-gen materials.¹⁹

Top 10 most funded next-gen material companies in 2023



Source: MII analysis on investment activities in companies included in MII's company database, based on data from PitchBook and primary research. *In 2024, Renewcell was rebranded as Circulose following its acquisition by the private equity firm Altor.



Are you one of them?







COOL















COOTPRINT COALITION





AT NEWTEC























































































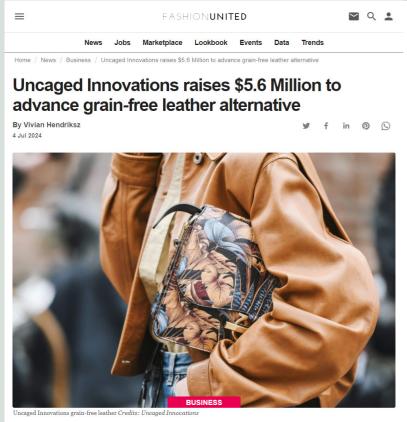


NEXT-GEN FUNDING IN THE NEWS

There have been 294 funding deals in next-gen material companies since 2014. Following is a selection of some notable rounds.



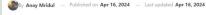
Click on the headline to read the news story.



Uncaged Innovations, a biomaterials start-up based in New York, announced that it has successfully raised 5.6 million USD in a seed investment round. The proceeds will be used to fund the commercial launch of the company's grainbased leather as well as the expansion of its team, including its manufacturing team.

Vegan Climate Alt Protein Cultivated Meat Fermentation Protein Zero Waste Fashion Eco Life Home > Alt Materials > Japan's Spiber Raises \$65M to Scale Up Production of Eco Materials Made from Fermented 'Brewed Pr Japan's Spiber Raises \$65M to Scale Up Production

of Eco Materials Made from Fermented 'Brewed Protein'

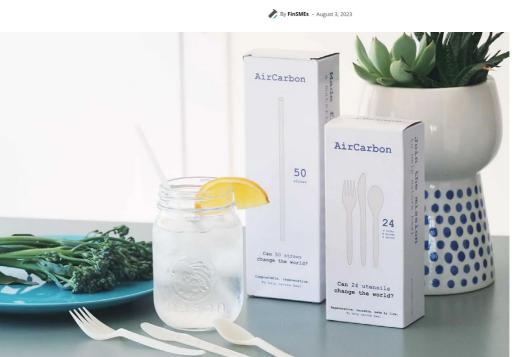




Japanese eco materials startup Spiber has secured ¥10B (\$65M) in funding to accelerate mass production of its fermentation-derived Brewed Protein for use in the fashion, automotive and personal care industries.



Newlight Technologies Closes US\$125M Funding Round



Newlight Technologies, Inc., a Huntington Beach, CAbased leader in decarbonization technology using natural microorganisms to convert greenhouse gas into highperformance AirCarbon®based materials, closed a US\$125m equity funding round.

FINSMES

Rubi Labs Raises \$8.7M in Seed Funding

By FinSMEs - March 4, 202

vegconomist

- the vegan business magazine -

Investments & Acquisitions

Australia's ALT.Leather Closes Oversubscribed \$1.1M Round for Biodegradable Leather Alternative

January 29, 2024

Female-led Australian startup ALT.Leather has raised \$1.1 million in an oversubscribed seed funding round after developing a plastic-free, bio-based leather alternative.





vegconomist

BioFluff Secures \$2.5M in Seed Funding for Plant-Based Fur Alternatives

November 30, 2023







HOME > SUSTAINABILITY > MATERIALS

SOURCING JOURNAL

Stella McCartney Presents the Hult Prize for Redesigning **Fashion to Banofi**

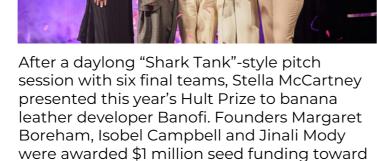
BY RHONDA RICHFORD SEPTEMBER 26, 2023 10:50AM











the development of their business.

"Just talking about a new silhouette, or the next color, I'm like, that's great, but really, who cares? To say it like that seems so old school to me. The fashion industry is fairly old fashioned and uses about 10 materials at the end of the day," she said of the industry's reliance on high-volume, low-cost textiles which pollute or cause deforestation. McCartney emphasized that the industry needs to invest in new materials development.



HOME > SUSTAINABILITY > MATERIALS

Algenesis Nabs \$5 Million for Plant-based **Material Production**

BY JENNIFER BRINGLE OCTOBER 30, 2023 12:04PM















FASHIONUNITED

Home / News / Business / Biomaterials start-up Gozen secures 3.3 million US dollars in funding

Biomaterials start-up Gozen secures 3.3 million US dollars in funding

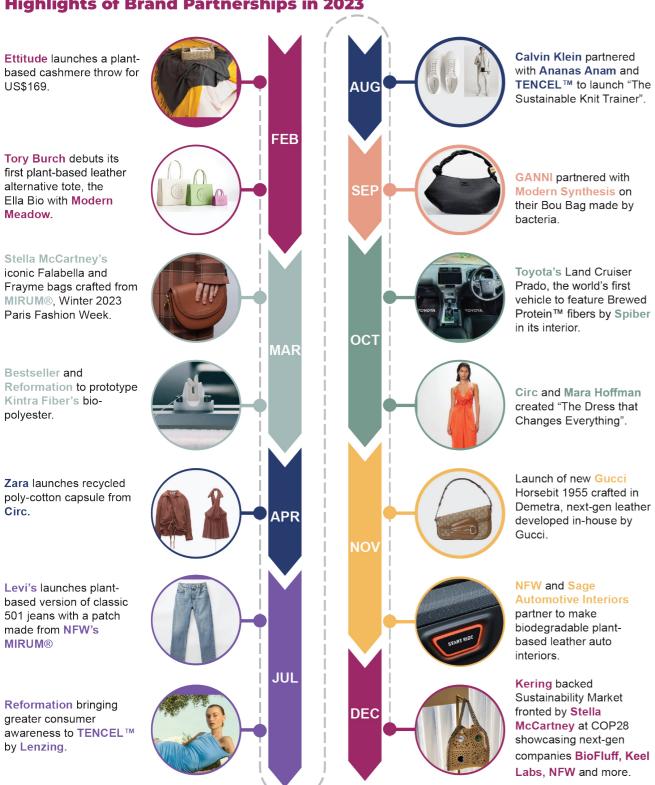


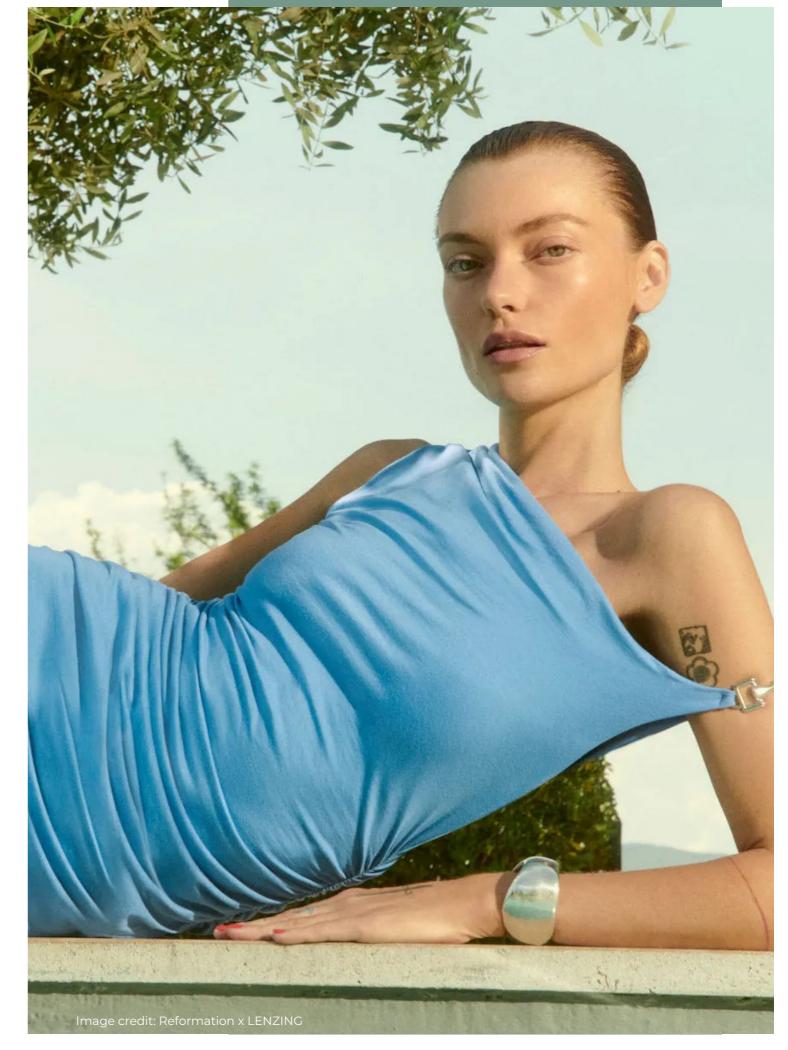
Gozen, the biomaterials startup looking to disrupt the fashion, automotive and home furnishings industries with its lab-grown leather alternative that is plastic and animal-free. has raised 3.3 million US dollars in seed funding.

Ece Gozen, founder and chief executive of Gozen. said in a statement: "At Gozen, we produce advanced biomaterials with the potential to unlock circular design. With this investment, we've shown that we have a path to delivering on that potential at scale."

NOTABLE COLLABORATIONS

Highlights of Brand Partnerships in 2023





WHY INVEST IN NEXT-GEN MATERIALS?

COMPETITIVE ADVANTAGES

Next-gen materials possess a range of competitive advantages that make them a strong candidate for investment. Their ability to address critical environmental and social issues, combined with their high performance and potential to disrupt the market, positions them as a key player in the future of the materials industry. As consumer and regulatory pressures continue to mount, the demand for these innovative materials is only expected to grow, offering significant opportunities for investors who recognize their potential.



APPLYING LESSONS FROM ALTERNATIVE PROTEINS TO NEXT-GEN MATERIALS

In recent years, alternative proteins have disrupted the food industry and continued to accelerate in technological advancement, sales and market share growth, and investments globally. Next-gen materials have emerged as the next big wave in this paradigm shift away from a reliance on industrial animal agriculture, and there are many parallels between the development of the two industries.

In fact there are single companies innovating in both areas. We see the next-gen materials industry as 5-10 years behind where the alternative protein industry is currently. In 2019, McKinsey & Co. estimated the market base for alternative protein at approximately USD2.2 billion compared with a global meat market of approximately USD1.7 trillion.²⁰

Harnessing Markets and Tech for Good: Plant-Based Milk Case Study

We believe in the power of markets and technology to bring about deep and rapid change in the materials industry. The growth of non-dairy milks provides a great example. Today, non-dairy milk makes up 15% of the entire milk market, while sales of dairy milk are on a steady decline. This dramatic shift didn't occur because more people began caring about the ethical or environmental consequences of dairy farming. It happened because non-dairy milks became more affordable, accessible, and delicious. Millions of non-vegan consumers enjoy plant-based milk on a regular basis simply because they prefer the flavor.



The next-gen materials industry can leverage the technological and production advances pioneered by the alternative protein field. Furthermore, people do not have the same attachment to cow leather or silkworm silk as they do to cow steak or swine bacon. This makes it easier to market next-gen materials to most consumers.

FURTHER INSIGHTS

Learn More with Our Reports

Our reports, publications, and factsheets analyze the state of the next-gen materials industry, map white space opportunities, advise entrepreneurs and next-gen material companies, and connect investors to exceptional investment opportunities. Find all of our reports at https://materialinnovation.org/reports/.

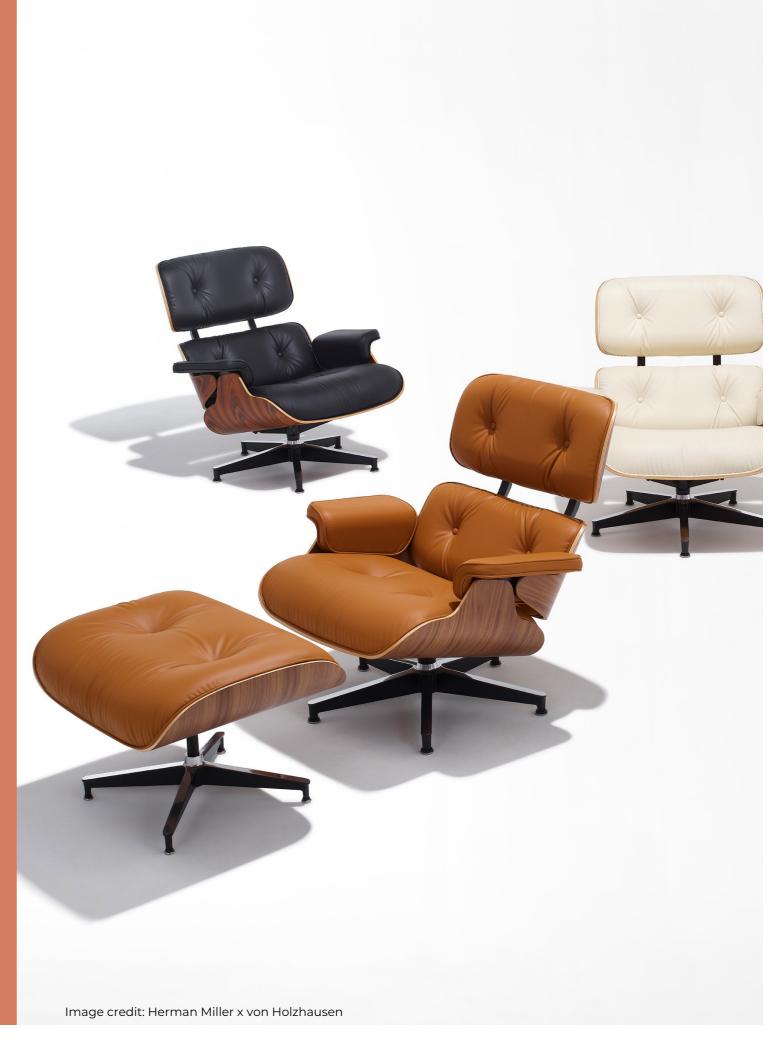
Key publications:

- See our **State of the Industry** reports for detailed information on the next-gen materials industry, including detailed investment analysis. Available at: https://materialinnovation.org/reports/?filter=true&reports_category=state-of-the-industry
- ► See our **Brand Engagement** reports and monthly **Lookbooks** for successful collaborations between brands and material companies. Available at: https://materialinnovation.org/reports/?filter=true&reports_category=brand-partnerships
- ► See our **Consumer Research** reports to learn more about consumer openness to next-gen materials. Available at: https://materialinnovation.org/reports/?filter=true&reports_category=consumer-research
- ► See our **White Space Reports** to learn about the untapped areas of the next-gen materials market. Available at: https://materialinnovation.org/reports/?filter=true&s=White%20Space
- See our **2-pager explainer** on the next-gen materials industry here: https://materialinnovation.org/wp-content/uploads/2024_MII-Overview_Animal-Focus.pdf

Next-Gen Innovation Databases

Our Next-Gen Innovation databases provide curated insights into the current landscape of companies developing innovative next-gen materials and resources.

- Our **Innovators Database** lists material companies creating next-gen materials that are animal-free and more sustainable alternatives to leather, silk, wool, down, fur, or exotic skins. Available to view or download at: https://materialinnovation.org/next-gen-innovation-databases/innovators-database/
- Innovators also need access to sustainable manufacturing and recovery solutions. Our **Disruptive Textile Technology Resources** list showcases companies developing disruptive textile innovation resources, including polymers, resins, fibers, additives, dyes, colorants, and finishing agents. Available to view at: https://materialinnovation.org/next-gen-innovation-databases/disruptive-textile-innovation-resources/





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MATERIA INNOVATI

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ABOUT MII

The Material Innovation Initiative is a nonprofit think tank that accelerates the development of high-performance, animal-free, and environmentally preferred materials with a focus on replacing silk, wool, down, fur, and leather and their synthetic alternatives. We advance the next-gen materials revolution by connecting science and big ideas. We focus on research, knowledge-sharing, and fostering connections to fast-track the development of environmentally preferable and animal-free materials.

www.materialinnovation.org

