ATARU™

APPLICATION

Elevating Radio Frequency Performance to New Heights

Next-Gen Ultra-Low-Loss DLP Resin

Advancements in additive manufacturing and material science have led to the development of ATARU materials, an ultra-low-loss resin specifically engineered for Digital Light Processing (DLP) and Stereolithography (SLA) printing.

This groundbreaking material enables the fabrication of high-precision, low-loss RF components, such as Luneburg lenses, using commercially available 3D printers. By improving accessibility to high-performance RF components, ATARU resin unlocks new scalable and cost-effective opportunities in telecommunications, and radar systems.

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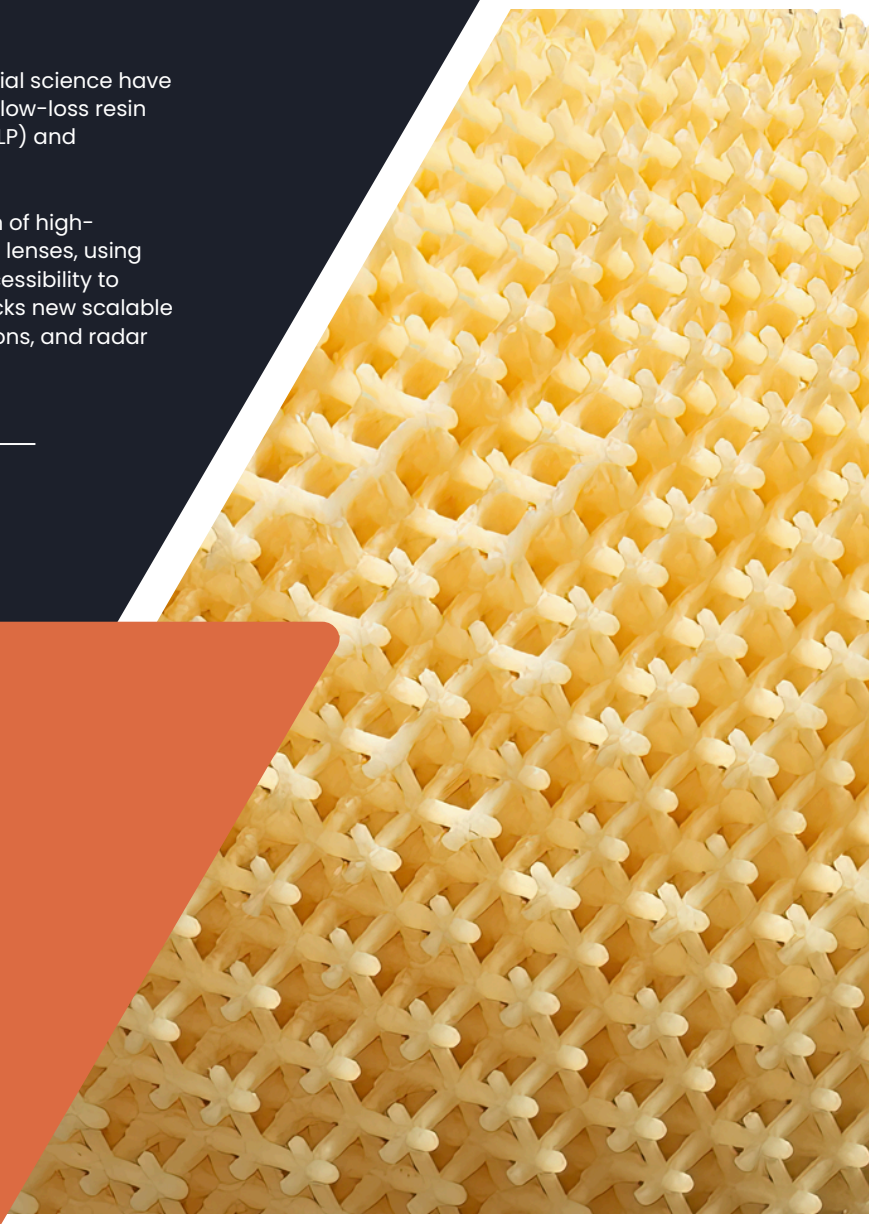


May 2025

Revolutionary Ultra-Low-Loss DLP Resin: Elevating Radio Frequency Performance to New Heights

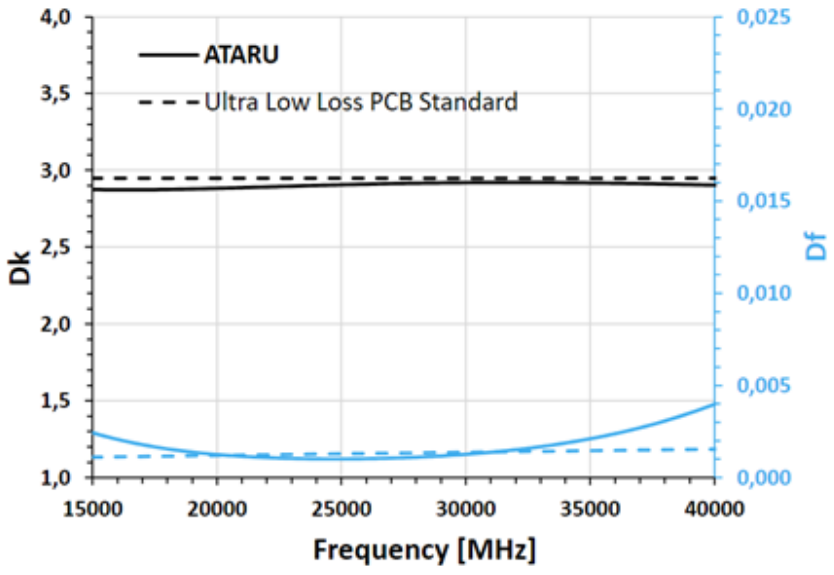
Traditional DLP and SLA resins face significant dielectric losses due to material absorption and scattering, which limits their use in high-performance RF components. These losses impact signal transmission and making traditional resins unsuitable for applications that require minimal signal degradation.

To overcome these challenges, ATARU materials ultra-low loss resin has been meticulously designed to optimize and minimize dielectric losses across a wide frequency range. The result is a material that reduces insertion losses, allowing for the fabrication of complex structures with exceptional precision and signal integrity.

Resin Properties & Performance

1. Low-Loss Characteristics

- Low Dielectric Loss Tangent (<0.005 at <40GHz) - Ensures minimal energy dissipation in RF applications, improving efficiency in telecommunications and radar systems.
- Stable Dielectric Constant (2.9) - Provides predictable electromagnetic performance across multiple frequencies, making it ideal for RF, microwave, and applications.



2. High Thermal & Mechanical Stability

- Thermal Stability (>300°C) - The resin withstands high temperatures and maintains material integrity, ensuring long-term reliability in harsh environments.
- Mechanical Durability - With a high modulus (5.6 GPa) and flexural strength (127 MPa), components made from this resin retain their shape and structural integrity over time.

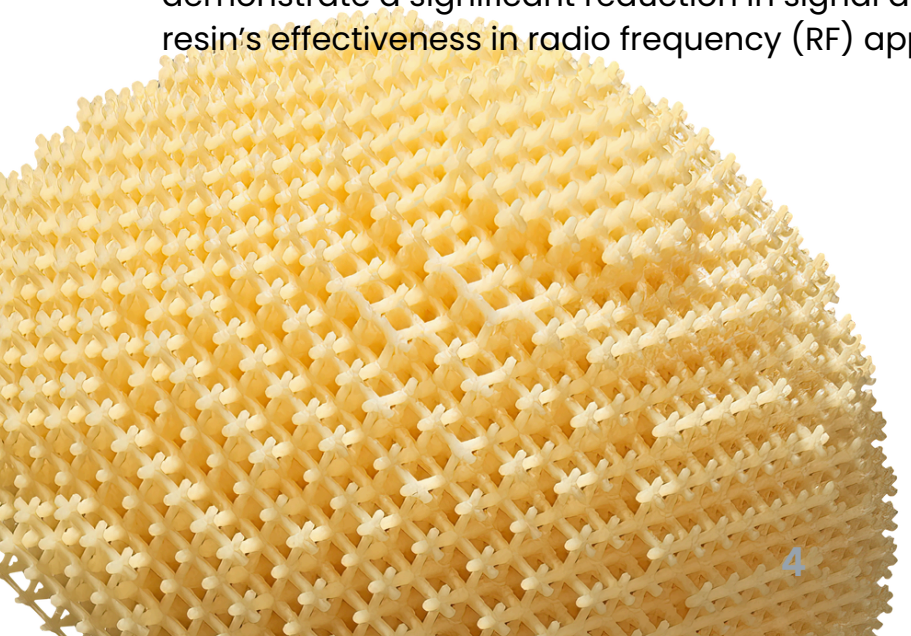
These properties make ATARU materials the ideal solution for high-performance RF components, addressing previous limitations in DLP/SLA manufacturing.

Demonstrated Application: Luneburg Lens Fabrication

To demonstrate the effectiveness of ATARU materials, Luneburg lenses were fabricated using commercially available DLP/MSLA 3D printers. The lens illustrated in the slide was printed with a Prusa SL1S printer. These lenses, known for their radially graded permittivity index, are widely applied in beam shaping for antennas and radar.

Performance Advantages of ATARU Materials in Luneburg Lenses

The ultra-low-loss resin enables precision gradient control by allowing for accurate refractive index gradients, which are essential for optimal Luneburg lens performance. Its compatibility with high-resolution printing ensures a high degree of surface smoothness, minimizing surface scattering and thereby enhancing signal integrity. Additionally, performance tests demonstrate a significant reduction in signal attenuation, confirming the resin's effectiveness in radio frequency (RF) applications.



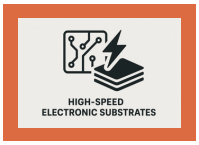
Key Applications & Industry Impact

Telecommunications & Wireless Networks

- Low-loss RF components for 5G/6G infrastructure.
- Advanced satellite communication antennas with minimal signal degradation.

Radar & Surveillance Systems

- Improved beamforming capabilities for automotive non-optical radomes and defense applications.
- High-performance sensors for surveillance, signal intelligence, and radar systems.

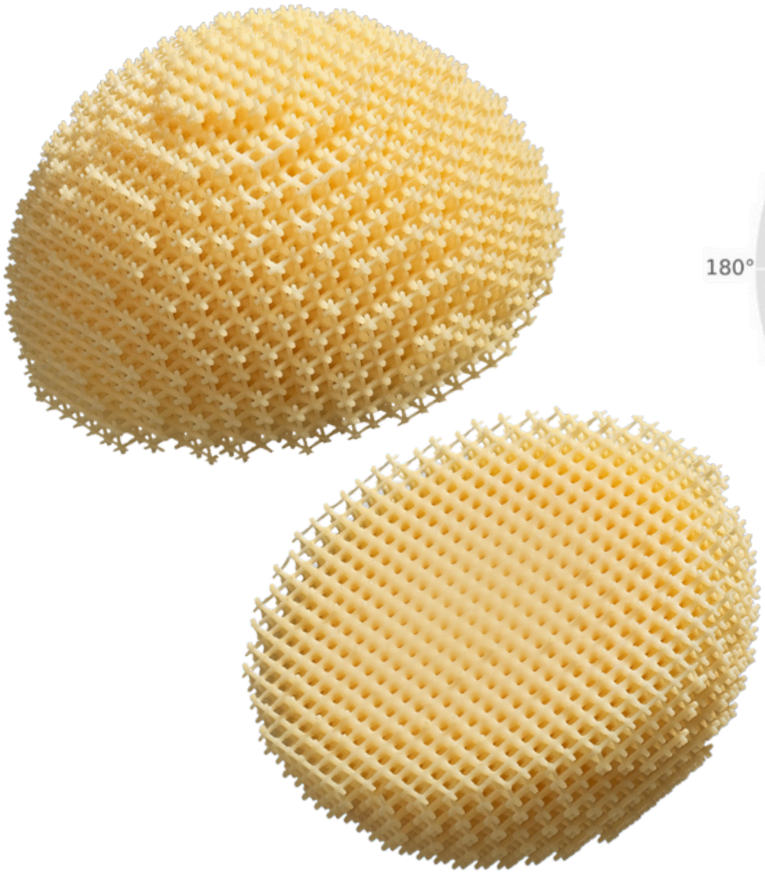


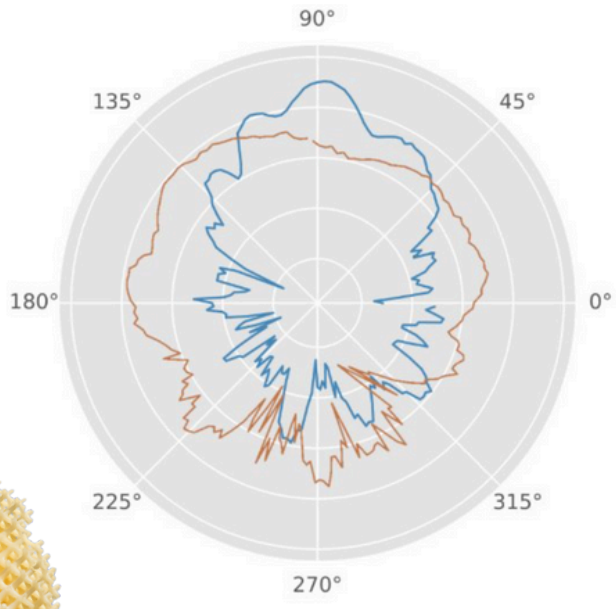
High-Speed Electronic Substrates

- Low-loss PCBs are crucial for signal integrity in high-speed circuits and are used in supercomputers and telecom infrastructure.
- Terahertz and mmWave PCBs enable next-generation data transmission with minimal signal attenuation.

Summary

The ultra-low-loss DLP resin from ATARU materials represents a transformative advancement in RF 3D printing. By enabling the affordable and scalable production of Luneburg lenses and other advanced RF structures, this resin is set to revolutionize telecommunications, radar, and beyond.





Precision Material for High-Frequency Performance

ATARU is at the forefront of advanced materials innovation, addressing critical limitations in traditional DLP and mSLA resins used for RF applications. Standard resins often suffer from significant dielectric losses due to absorption and scattering, making them unsuitable for high-performance signal transmission. ATARU's ultra-low-loss resin is engineered to minimize these dielectric losses across a wide frequency range. This cutting-edge material reduces insertion loss and enables the precise fabrication of complex RF components, ensuring exceptional signal integrity and performance in demanding environments.

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