Richard P. Feynman Center for Innovation

Technology Snapshot

Los Alamos NATIONAL LABORATORY

Glass Components Fabricated via Aerosol Jet Printing

An additive manufacturing method for micron-scale glass component fabrication

Value Proposition

This technology enables the fabrication of micron-scale glass components using an additive manufacturing approach. Conventional fabrication methods rely on subtractive machining, which can limit achievable geometries and increase processing complexity at small scales. By depositing glass material directly into its final geometry and sintering it into a dense structure, this method provides an alternative pathway for producing small, high-precision glass features.

Technology Readiness Level 3

IP Information

This technology is disclosed under "*Glass components fabricated via aerosol jet printing.*"

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Please include LANL Reference ID **S-167756** when reaching out.

Overview

Micron-scale glass components are widely used in optical, photonic, and micro-fabricated systems. These components are commonly produced through grinding, polishing, and milling processes that require tight tolerances and specialized equipment. As device architectures become more compact and geometrically complex, these approaches can constrain design flexibility and integration.

Los Alamos researchers developed an additive manufacturing process that builds glass components layer by layer using aerosol jet printing. Glass particles suspended in an aerosolizable carrier solution are deposited onto a substrate and then sintered to form monolithic glass structures. This approach enables controlled fabrication of small glass features without bulk glass melting or post-fabrication machining.

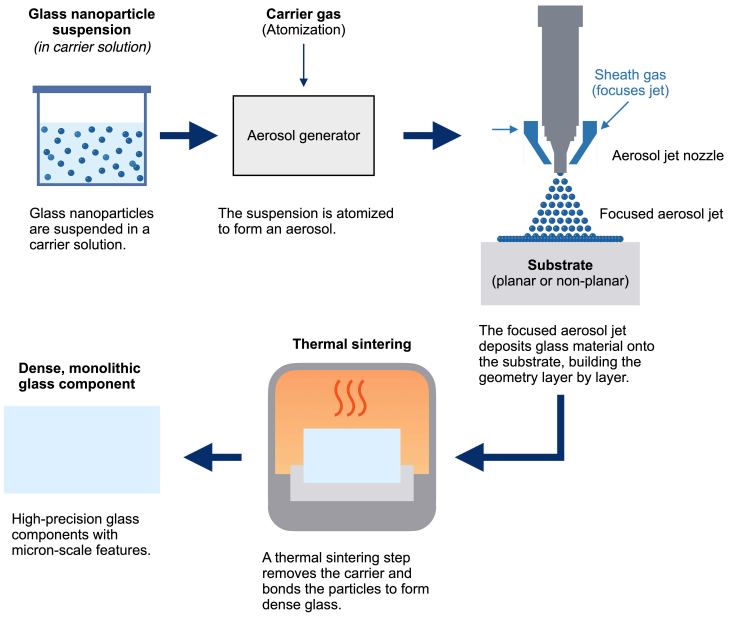

Fig 1. Process flow for aerosol jet printing of glass nanoparticle suspensions. Glass particles suspended in a carrier solution are aerosolized and delivered through a focused jet onto a substrate to build features layer by layer. A subsequent thermal sintering step removes the carrier and densifies the material into a monolithic glass component.

Advantages

- Enables additive fabrication of micron-scale glass components
- Reduces reliance on precision subtractive glass machining
- Supports complex geometries and embedded glass features
- Compatible with multiple glass compositions and substrates
- Integrates with existing aerosol jet printing platforms

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Technology Description

The method uses aerosol jet printing to deposit fine glass particles or sol-gel-based materials with micron-scale resolution. Deposition conditions are adjusted to build glass features to a specified thickness and geometry. After deposition, the printed material is sintered to remove the carrier and bond the particles into a dense glass component.

Demonstrations show that the process can produce continuous, monolithic glass features on planar substrates. The method supports multiple glass compositions and allows components to be fabricated directly in their final configuration.

Market Applications

This additive glass fabrication method is relevant to technologies that require small, high-precision glass components, including:

- micro-optics and micron-scale lenses
- optical waveguides and photonic interconnects
- optical filters and coatings
- glass-to-metal seals and microfluidic structures
- photonic and optical packaging platforms

These and related applications benefit from increased flexibility in the fabrication of glass features at small scales.

Contact

To learn more or to discuss potential interest in this technology, please contact the Feynman Center for Innovation at licensing@lanl.gov.