



Nanoparticle Synthesis System Enables High Deposition Rate

Scaled-up System for Nanoparticle Deposition

Nanoparticles such as FeCo-FeCoO, FeCo-Au, FeCo-SiO₂, Fe-Ag, Co-Au, C, Fe-Au are currently limited to laboratory scale production due to a lack of a system to produce these nanoparticles in large quantities. But a nanoparticle synthesis system has been designed that produces unique nanoparticles including gold shells with high crystallinity and high magnetic moment nanoparticles on an industrial scale, some of which are not possible to produce using other processes. A non-chemical, physical process using a sputtering target enables high-throughput performance. The nanoparticles may be utilized in industrial applications ranging from biomedical to solar and data storage applications.

The Nanoparticle Synthesis System Improves Gas-phase Condensation Techniques

The nanoparticle deposition system relies on a gas phase condensation technique based on a sputtering source. This nanoparticle deposition system involves four key improvements:

- A tube sputtering target design
- A new rotational magnetron
- A new nanoparticle collection setup and handling process, which enables continual collection of nanoparticles on a flexible substrate without breaking the vacuum to change the sputtering target
- A new multi-source nanoparticle deposition system, which will enable deposition of composite films with different nanoparticles

Together, these improvements enable high deposition rates for a class of both nanoparticles and superior morphology for nanoparticles capable of being produced via other methods.

FEATURES AND BENEFITS OF THE SCALED-UP NANOPARTICLE DEPOSITION SYSTEM:

- Produces nanoparticles such as FeCo-FeCoO, FeCo-Au, FeCo-SiO₂, Fe-Ag, Co-Au, C, Fe-Au with a high deposition rate
- Produces high magnetic moment nanoparticles with high crystallinity (morphology)
- Offers the ability to handle flexible substrates and control the deposition composite structure
- Applications in biomedical treatments, data storage and multi-junction solar cells

Product Details

There are four separate components to the scaled-up nanoparticle deposition system

- A new target design
- A new rotational magnetron
- A new nanoparticle collection setup and handling process, which will enable continually collecting nanoparticles on flexible substrate without breaking down the vacuum to change the substrates.
- A new multi-source nanoparticle deposition system, which will enable deposition of composite films with different nanoparticles for the first time.

Technology ID

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Phase of Development Simulations are complete. The prototype device is currently being constructed.

Researchers

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- Iron Nitride Permanent Magnet, Alternative to Rare Earth and Neodymium Magnets
- [Giant Magnetoresistance Biomolecule Sensing System](#)
- Biomedical Sensor Using GMR Sensor and Magnetic Nanoparticles