

Technology Offer

Uniform Deposition of Large-Area Multicomponent Coatings using Laser Irradiation Scanning of Predesigned Targets

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Pulsed laser deposition (PLD) facilitates efficient production of thin films using a laser ablation technique. Targets are selected according to the coating desired. Multiple targets are either moved mechanically to the incidence area, or they are fixed so that the laser beam is alternatively focused on each of them. Multiple targets are, however, known to cause discontinuities, whereas single multicomponent target usually doesn't ensure compositional homogeneity. The technology presented here provides unique multicomponent target design and arrangement of light source to obtain uniform large-area deposition.

Technology

The technology describes deposition of materials on large areas by adjusting laser beam characteristics, introducing novel target architecture, and adjusting the scanning geometry of the laser beam.



Image of a multicomponent target in the PLD vacuum chamber.

Advantages

- Uniform deposition on large areas using multicomponent target and unique arrangements of incidence laser irradiation and target motion.
- One laser source with fixed deposition coordinates is required.
- Special arrangement of optics result in line scanning that can be adjusted according to the size and architecture of the target.



- Target motion and the line scanning geometry offer no restriction to the size and architecture of the target.
- Requires no multiple targets thereby avoiding discontinuities in the deposited layers.
- Reacted-product as target is not a necessity.
- Instead of reacted-product, individual components are arranged to obtain unique target architecture, which upon rotation and laser line scanning presents large-area single or multilayered coatings.
- Composition of coatings is controlled by irradiation area.
- Sequence and thickness of multilayer can easily be adjusted by target architecture and motion. Concentration gradients between the layers and within a given layer are feasible.
- Complex geometry of substrates can easily be accommodated.
- Coatings of Al-Ti-Nb and NbCr₂ on alumina and molybdenum substrates have been accomplished.
- Uniform deposition of coatings between 5 and 100 nm were obtained.

Patent Information

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