

# A process model for Selective Laser Alloying

The present invention consists of a novel process for 3D printing a product, utilizing selective laser alloying of elemental powders to produce metal ceramic parts with specific desired alloys shapes and internal structures.

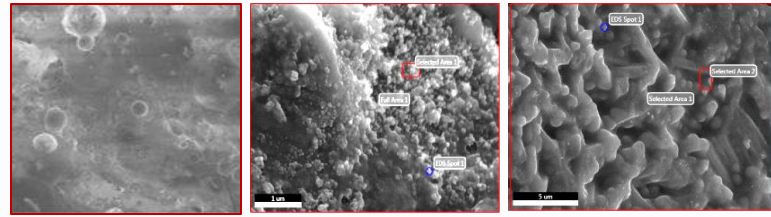
## Problem

The traditional printing and alloying methods including cast and powder based metallurgical approaches, significantly affect the micro-structure of the output alloy, impairing its quality and desired physical properties. These methods are also very slow and energy consuming.

## Solution

This method 1) adjusts the material composition along all three axes of a part, 2) significantly reduces energy consumption in laser processing, 3) processes metallic/ceramic materials from elemental powders with high melting points at lower melting temperatures, and 4) creates micro scale porous structures with controllable shapes, sizes and distributions.

Laser Alloyed Ti-B<sub>2</sub> Samples with various Surface Structures



## Value Proposition

- This novel technology utilized the reaction energy released from the reaction between elemental titanium and boron powder to reduce the process energy and time consumption of laser-based 3D metal printing.
- It provides solution for in-situ alloying with desired materials at desired locations

## Competitive Advantages

- 3D printing (free forming) hard-to- process metal and ceramic materials
- Production of parts with complex internal/external shapes or structures
- Saves on processing time and heating requirements
- Simplified process model and parameters
- Alloys of varying porosity can be produced by controlling parameters
- Self-sustaining/controllable laser boriding process

## IP Status

- Patent Pending #US20190283135A1
- Licensing available

## Status of Development

- Prototyping stage

For further information regarding this Technology please contact:

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