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	1)Buradagunta Ratna
classification	Sunil
(31) Priority	Address of Applicant
Document :NA	:Dr. Buradagunta Ratna
	Sunil, Associate
(32) Priority :NA	Professor, Department of
Date	Mechanical Engineering,
(33) Name	Bapatla Engineering
of priority :NA	College, Bapatla
country	522101, Andhra
(86) International	Pradesh, India Andhra
	Pradesh India
Application :NA No :NA	(72)Name of Inventor:
Filing	1)Nagoju Manikanta
Date	Sarath Kumar
(87)	2)Mukku Venkataiah
International : NA	3)Vookoti Uma Sai
Publication: NA	Vara Prasad
- No No No	4)Gamini Suresh
(61) Patent	5)Mangam Venu
of Addition	6)Buradagunta Ratna
to	Sunil
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(57) Abstract:

Solid state deposition (SSD) of an alloy surface layer on a substrate without melting the substrate is disclosed. At least one aluminium rod having holes at one end and which are filled with magnesium and zinc pins is used to deposit a layer of aluminium-magnesium-zinc alloy on a substrate of aluminium. Due to the friction between the aluminium substrate and the rotating aluminum rod that contains magnesium and zinc pins heat is generated which melts the magnesium and zinc pins to form aluminium-magnesium-zinc alloy. The plasticized Aluminum-magnesium-zinc material is transferred from the rotating rod to the aluminium substrate and forms a strong metallurgical bonding with mechanical mixing of the material at the interface of the coated layer and the substrate. During the entire process the aluminium substrate and the rotating rod do not undergo melting and stay within the solid state.

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#### Patent Search

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#### Inventor

Name	Address	Country	Nat
Nagoju Manikanta Sarath Kumar	Research Scholar, Department of Mechanical Engineering, Vignan's Foundation for Science, Technology & Research, Vadlamudi, Guntur 522213, A.P., India	India	Indi
Mukku Venkataiah	Assistant Professor, Vignan's Lara Institute of Technology & Science (VLITS), Vadlamudi 522213, Guntur (Dt.), A.P., India	India	Indi
Vookoti Uma Sai Vara Prasad	Research Scholar/Teaching Assistant, Department of Mechanical Engineering, Vignan's Foundation for Science, Technology & Research, Vadlamudi 522213, Guntur, A.P., India	India	Indi
Gamini Suresh	Associate Professor, Department of Mechanical Engineering, Vignan's Foundation for Science, Technology & Research Vadlamudi, Guntur 522213, A.P., India	India	Indi
Mangam Venu	Professor, Department of Mechanical Engineering, Vishnu Institute of Technology, Bhimavaram West Godavari 534201, A.P., India	India	Indi
Buradagunta Ratna Sunil	Dr. Buradagunta Ratna Sunil, Associate Professor, Department of Mechanical Engineering, Bapatla, Engineering College, Bapatla 522101, Andhra Pradesh, India	India	Indi

### Applicant

Name	Address	Country	Nat
Buradagunta Ratna Sunil	Dr. Buradagunta Ratna Sunil, Associate Professor, Department of Mechanical Engineering, Bapatla Engineering College, Bapatla 522101, Andhra Pradesh, India	India	Indi

#### Abstract:

Solid state deposition (SSD) of an alloy surface layer on a substrate without melting the substrate is disclosed. At least one aluminium rod having holes at one end and whi filled with magnesium and zinc pins is used to deposit a layer of aluminum-magnesium-zinc alloy on a substrate of aluminium. Due to the friction between the aluminium substrate and the rotating aluminum rod that contains magnesium and zinc pins heat is generated which melts the magnesium and zinc pins to form aluminium-magnesi alloy. The plasticized Aluminum-magnesium-zinc material is transferred from the rotating rod to the aluminium substrate and forms a strong metallurgical bonding with mechanical mixing of the material at the interface of the coated layer and the substrate. During the entire process the aluminium substrate and the rotating rod do not un melting and stay within the solid state.

#### **Complete Specification**

Claims:1. We claim, producing surface alloy layer on a metallic substrate by solid state deposition method comprising:

Processing at least one substrate of pure aluminium to provide a surface alloy coating layer without melting the substrate by using an aluminium rod which contains a minimum of two or more than two holes at one end of the rod which are filled with magnesium and zinc pins in 1:1 Wt.% ratio.

- 2. The method of claim 1 where in the chemical composition of aluminium rod is with 99.5% Al and remaining being any impurity elements by Wt.%. The chemical composition of magnesium pin is with 99.5% Mg and remaining being any impurity elements by Wt.%. The chemical composition of zinc pin is with 99.5% Zn and remain being any impurity elements by Wt.%.
- 3. The method of claim 1 where in the sample of substrate can be a minimum of 100 mm length, 50 mm width and 5 mm thickness and the sample of aluminium rod of be a minimum of 25 mm diameter with 100 mm length and the holes at one end can be drilled with minimum of 2 mm diameter and 20 mm length.
- 4. The method of claim 1 where in a thin polyethylene sheet with a minimum of thickness 100 μm is used to close the holes filled with magnesium and zinc and is evaporated during the process due to the heat generated between the aluminium rod and the substrate.
- 5. The method of claim 1 where in the aluminium rod consisting of magnesium and zinc pins is rotated and brought to touch the surface of pure aluminium substrate applying a load ranging from 5kN to 10kN for 15 s.
- 6. The method of claim 1 where in the substrate and the rotating aluminium rods both stay within the solid state.
- 7. The method of claim 1 where in heat is generated due to friction between the aluminium rod and the aluminium substrate by which the magnesium and zinc pins fi in the holes of aluminium rod undergo melting and aluminium-magnesium-zinc alloy is formed during the transfer of material from the rotating rod to the substrate

**View Application Status** 



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