

本出版物被SCI收录

ISSN1002-185X

CODEN XJCGEA

稀有金属材料与工程

RARE METAL MATERIALS AND ENGINEERING



2017年3月
第46卷

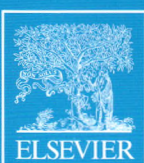
3

中国有色金属学会
中国材料研究学会
西北有色金属研究院

主 办

科 学 出 版 社

出 版



万方数据

XIYOU JINSHU CAILIAO YU GONGCHENG
稀有金属材料与工程

主管单位 中国科学技术协会
主办单位 西北有色金属研究院 中国有色金属学会 中国材料研究学会
出版单位 科学出版社
月刊 国内外公开发行人 第 46 卷 第 3 期 总第 368 期 2017 年 3 月



目次

材料科学

- 美国 SCI Expanded®, Research Alert®, Materials Science Citation Index® 收录期刊
- 美国工程索引 (EI) 文献源期刊
- 国家重点学术期刊
- 国家精品科技期刊
- 两届中国百强报刊
- 两届国家期刊奖
- 期刊数字影响力百强
- 国家数字出版示范单位
- 中国优秀科技期刊一等奖
- 首届中国科协优秀国际科技期刊奖
- 中国有色金属工业优秀科技期刊一等奖
- 全国有色金属优秀科技期刊一等奖
- 中国期刊方阵双奖期刊
- 中国最具国际影响力的学术期刊
- 中国权威学术期刊
- 陕西省首届“大报名刊工程”期刊
- 陕西省优秀科技期刊特等奖
- 陕西省科协精品科技期刊
- 陕西省第 2 届精品科技期刊
- 陕西省新闻出版行业文明单位
- 中国科技论文统计源期刊
- 中国科学引文数据库文献源
- 中文核心期刊
- 中国材料科学核心期刊
- 同方数据独家授权期刊
- 美国化学文摘 (CA) 文献源期刊
- 英国科学文摘 (INSPEC) 文献源期刊
- 日本科学技术文献速报 (JICST) 用刊
- 俄罗斯文摘杂志 (AJ) 文献源期刊
- 剑桥科学文摘 (CSA) 文献源期刊
- 美、英金属文摘 (MA) 文献源期刊
- 美国国会图书馆收藏刊物

Microstructure and Properties of Peg-nail Structured YSZ TBCs by Selective Laser Modification after Plasma SprayingChang Fa, Zhou Kesong, Tong Xin <i>et al</i> (577)
Influence of Cu Content in Precursor Powders on the Phase Evolution and Superconducting Properties of Bi-2212 SuperconductorsZhang Shengnan, Li Chengshan, Hao Qingbin <i>et al</i> (585)
Preparation and Properties of Yb:YAG and Nd:YAG NanocrystalsSi Wei, Zhang Junji (591)
Strain-Induced Diffusion of Nickel in Nanocrystalline Fe Produced by High Energy Shot PeeningSun Jianchun, Chen Dengming, Ma Yilong (596)
Thermal Shock Failure Mechanism of Nanostructured Zirconia Coating by Atmospheric Plasma SprayingChang Ying, Liu Bei, Dong Shijie <i>et al</i> (601)
Effects of Trace Reinforcements on Microstructure of TC18 Titanium Matrix Composit.....Sun Shuyu, Lv Weijie (606)
Effects of Laser Cladding Layers Width on Total Indicated Runout Characteristics of Steam Turbine Rotor SurfaceGuo Shirui, Shang Huichao, Cui Lujun <i>et al</i> (612)
Field Emission Characteristics of Metal-doped Nanodiamond Cathode on Titanium SubstrateYang Yanning, Li Weixia, Zhang Zhiyong <i>et al</i> (617)
Mechanical Properties and Formability of Ultrasonic Treated Twin Roll Casting Magnesium Alloy SheetYu Kun, Xiong Hanqing, Dai Yilong <i>et al</i> (622)
Effects of Cu Content on Microstructure and High- Temperature Oxidation Behavior of Ti-Al-Si-Cu-N Nanocomposite FilmsFeng Changjie, Chen En, Li Mingsheng <i>et al</i> (627)
Effect of Different Heat Treatments on Microstructure and Mechanical Properties of Ti6Al4V Titanium AlloyLiu Wanying, Lin Yuanhua, Chen Yuhai <i>et al</i> (634)

XIYOU JINSHU CAILIAO YU GONGCHENG
稀有金属材料与工程



主管单位 中国科学技术协会
主办单位 西北有色金属研究院 中国有色金属学会 中国材料研究学会
出版单位 科学出版社
月刊 国内外公开发行 第 46 卷 第 3 期 总第 368 期 2017 年 3 月

Interface Bonding Mechanism and Mechanical Behavior of AZ31B/TA2
Composite Plate Cladded by Explosive Welding
..... Wu Jiaqi, Wang Wenxian, Cao Xiaoqing *et al* (640)

Microstructural Evolution of an Experimental Third Generation Single
Crystal Superalloy after Long-term Thermal Exposure at 1100 °C
..... Wang Xiaoguang, Li Jiarong, Liu Shizhong *et al* (646)

Microstructure and Properties of AlCoCrFeNiB_x(*x*=0, 0.1, 0.25, 0.5,
0.75, 1.0) High Entropy Alloys
..... Chen Qiushi, Dong Yong, Zhang Junjia *et al* (651)

Influence of Ethylene Diamine Tetraacetic Acid on the Performance of
Magnesia Supported Ru-based Catalysts for Ammonia Synthesis
..... Huo Chao, Cheng Xiangwei, Du Yanlei (657)

显微组织均匀性对片层 Ti-55531 合金高周疲劳裂纹萌生的影响
..... 黄朝文, 赵永庆, 辛社伟等 (663)

纳米压痕法分析 ECAP 变形工业纯钛的力学性能
..... 刘晓燕, 赵西成, 杨西荣等 (669)

粉末注射成形 Ti-12Mo 合金的摩擦磨损性能
..... 支玲玲, 路新, 孙博等 (675)

SO₂ 对 CoCrFeNiTi_{0.5} 合金耐碱金属硫酸盐腐蚀行为的影响
..... 李萍, 秦鹏, 庞胜娇等 (680)

Zr-Sn-Nb 合金织构与力学性能..... 张福全, 马永富, 周惦武等 (687)

复合制备 Ni 基合金涂层的组织结构及性能演变特征
..... 杨效田, 王鹏春, 李霞等 (693)

高强高导 Cu-Nb 微观复合材料的尺寸效应
..... 梁明, 徐晓燕, 王鹏飞等 (699)

超细/纳米结构 WC-10Co-4Cr 涂层的透射电镜表征与性能分析
..... 王学政, 王海滨, 宋晓艳等 (704)

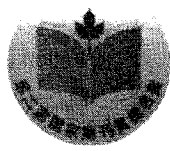
氢化物对 N18 锆合金原位拉伸断裂行为的影响
..... 刘锦云, 蒲霞, 孙超等 (711)

不同状态的 Mg-6Gd-2Y 合金的显微组织特征
..... 杨忠, 王战华, 段洪波等 (716)

AZ31B 镁合金轧制过程中的温升效应
..... 丁云鹏, 朱强, 马庆武等 (722)

出版 科学出版社
(北京市东黄城根北街 16 号, 100717)
编辑 《稀有金属材料与工程》编辑部
主编 张平祥
副主编 石应江
编辑部主任 李哲
责任编辑 蒲正利 刘延昌 谢曼
梁燕 苑硕
英文编辑 齐国翠
编务 翟惠玲 刘亚利
排版 王嵘 杜亚凤
本期责任编辑 谢曼 蒲正利
印刷 西安创维印务有限责任公司
国内发行 中国邮政集团公司
陕西省报刊发行局
国内发行代号 52-172
国外发行 中国国际图书贸易总公司
(北京市 399 信箱, 100048)
国外发行代号 M4873
编辑部地址 西安市 51 号信箱 710016
电话 029-86231117
传真 029-86231103
<http://www.rmme.ac.cn>
E-mail: rmme@c-nin.com
国内统一连续出版物号 CN 61-1154/TG
国际标准连续出版物号 ISSN 1002-185X
广告经营许可证号 6100004000085
国内外公开发行
定价 100 元

XIYOU JINSHU CAILIAO YU GONGCHENG
稀有金属材料与工程



主管单位 中国科学技术协会
主办单位 西北有色金属研究院 中国有色金属学会 中国材料研究学会
出版单位 科学出版社
月刊 国内外公开发刊 第 46 卷 第 3 期 总第 368 期 2017 年 3 月

Mg-8.07Al-0.53Zn-1.36Nd 镁合金微观组织及裂纹演变行为.....崔晓明, 白朴存, 刘 飞等 (728)
Al-RE(La,Y)合金相稳定性与固溶度的第一性原理.....王海燕, 高雪云, 曾建民等 (735)
固/液熔接 CuW/ZL101A 界面结合机理.....邓 颖, 梁淑华, 邹军涛等 (740)

材料工艺

粉末冶金医用超细晶 β 型 Ti28Nb2Zr8Sn 合金的显微组织与力学性能.....王 芬, 李鑫鑫, 杨 超等 (747)
Al 含量微调对 TiAl 合金组织及压缩力学性能的影响.....郝彦君, 刘金旭, 李建崇等 (754)
TC18 钛合金电子束熔丝成形送丝工艺与显微组织性能.....黄志涛, 锁红波, 杨 光等 (760)
微弧氧化处理 TC4 合金表面微动磨损性能.....李 康, 付雪松, 胡建军等 (765)
钛/铝/钛三层板的一次爆炸复合.....范敏郁, 郭训忠, 崔圣强等 (770)
热处理对 Nb-35Ti-4C 合金微观组织和力学行为的影响.....魏文庆, 刘炳强, 姜军生等 (777)
机械合金化制备纳米晶 Ti-6Al-4V 合金.....王家惠, 吴承玲, 史庆南 (783)
化学镀 Ni-P 电镀 Ni-Co-Mn 复合层力学及耐腐蚀性能.....奚小波, 缪 宏, 金亦富等 (790)
预回复对 Al-11.5Zn-3.5Mg-2.3Cu-0.24Zr 挤压材固溶-T652 组织与性能的影响
.....许晓静, 蒋 伟, 邓平安等 (796)
Gd³⁺/Ga³⁺共掺杂石榴石型 Yb₃Al₅O₁₂ 材料的制备及热物理性能.....李剑生, 刘艳丽 (802)
超音速等离子喷涂 WC-17Co 纳米涂层的性能.....李万青, 林铁松, 宋超群等 (807)
Y₂O₃ 对铝合金表面激光增材制造组织及耐蚀性影响.....王成磊, 高 原, 张光耀 (812)
低温磁控溅射制备 AZO 薄膜及绒面研究.....张宽翔, 彭 寿, 姚婷婷等 (818)
自牺牲模板法制备多孔 MnCo₂O_{4.5} 及其对高氯酸铵热分解的催化性能
.....李 纲, 张文彦, 迟煜岷等 (824)
M42 热处理中淬火温度对碳化物转变机制的影响.....刘博文, 路 新, 皮自强等 (829)
CNTs 和 Ti 掺杂对 W 基金属微观组织结构及力学性能的影响.....张玉翠, 沙建军, 王永昌等 (835)
一步微波有机溶剂法制备燃料电池 Pt/C 电催化剂.....吴燕妮, 陈志胜, 莫再勇等 (841)
泡沫钛生长二氧化钛纳米管的制备.....崔 光, 孙进兴, 刘培生 (847)
热等静压制备铜金刚石复合材料.....王方宇, 王文超, 石 明等 (853)

综合评述

透氢钒基金属膜.....江 鹏, Guangsheng Song, Daniel Liang 等 (857)
第一性原理在 Ni₂MnGa 合金研究中的应用.....张敏刚, 孙 娜, 郭艳萍等 (864)

RARE METAL MATERIALS AND ENGINEERING

This publication is covered in SCI Expanded®, Research Alert®, and Materials Science Citation Index®

Monthly, International Scholarly Journal, ISSN 1002-185X Vol. 46 No. 3 Sum 368 March 2017

CONTENTS

Materials Science

- Microstructure and Properties of Peg-nail Structured YSZ TBCs by Selective Laser Modification after Plasma Spraying
..... Chang Fa, Zhou Kesong, Tong Xin *et al* (577)
- Influence of Cu Content in Precursor Powders on the Phase Evolution and Superconducting Properties of Bi-2212 Superconductors
..... Zhang Shengnan, Li Chengshan, Hao Qingbin *et al* (585)
- Preparation and Properties of Yb:YAG and Nd:YAG Nanocrystals
..... Si Wei, Zhang Junji (591)
- Strain-Induced Diffusion of Nickel in Nanocrystalline Fe Produced by High Energy Shot Peening..... Sun Jianchun, Chen Dengming, Ma Yilong (596)
- Thermal Shock Failure Mechanism of Nanostructured Zirconia Coating by Atmospheric Plasma Spraying
..... Chang Ying, Liu Bei, Dong Shijie *et al* (601)
- Effects of Trace Reinforcements on Microstructure of TC18 Titanium Matrix Composite..... Sun Shuyu, Lv Weijie (606)
- Effects of Laser Cladding Layers Width on Total Indicated Runout Characteristics of Steam Turbine Rotor Surface
..... Guo Shirui, Shang Huichao, Cui Lujun *et al* (612)
- Field Emission Characteristics of Metal-doped Nanodiamond Cathode on Titanium Substrate..... Yang Yanning, Li Weixia, Zhang Zhiyong *et al* (617)
- Mechanical Properties and Formability of Ultrasonic Treated Twin Roll Casting Magnesium Alloy Sheet..... Yu Kun, Xiong Hanqing, Dai Yilong *et al* (622)
- Effects of Cu Content on Microstructure and High- Temperature Oxidation Behavior of Ti-Al-Si-Cu-N Nanocomposite Films
..... Feng Changjie, Chen En, Li Mingsheng *et al* (627)
- Effect of Different Heat Treatments on Microstructure and Mechanical Properties of Ti6Al4V Titanium Alloy
..... Liu Wanying, Lin Yuanhua, Chen Yuhai *et al* (634)
- Interface Bonding Mechanism and Mechanical Behavior of AZ31B/TA2 Composite Plate Cladded by Explosive Welding
..... Wu Jiaqi, Wang Wenxian, Cao Xiaoqing *et al* (640)
- Microstructural Evolution of an Experimental Third Generation Single Crystal Superalloy after Long-term Thermal Exposure at 1100 °C
..... Wang Xiaoguang, Li Jiarong, Liu Shizhong *et al* (646)

This Journal is covered in SCI Expanded®, Research Alert®, Materials Science Citation Index® (MSCI); Engineering Index (EI); Chemical Abstracts (CA); Abstracts Journal (AJ); INSPEC; JICST; Cambridge Scientific Abstracts (CSA); Metals Abstracts (MA); World Aluminum Abstracts; Chinese Scientific and Technical Papers and Citations (CSTPC); Chinese Science Citation Index (CSCI).

Administrated by China Association for Science and Technology

Sponsored by Northwest Institute for Nonferrous Metal Research, the Nonferrous Metals Society of China, Chinese Materials Research Society

Published by Science Press
(16 Donghuangchenggen North Street, Beijing 100717, China)

Edited by Rare Metal Materials and Engineering Press

Editor in Chief: Zhang Pingxiang

Address: P. O. Box 51, Xi'an, Shaanxi, 710016, China

Tel: 0086-29-86231117

Fax: 0086-29-86231103

http: //www.rmme.ac.cn

E-mail: rmme@c-nin.com

Overseas Distributor: China International Book Trade Corporation (P. O. Box 399, Beijing 100048, China)

Overseas Annual Subscription Rate: USD300

RARE METAL MATERIALS AND ENGINEERING

This publication is covered in SCI Expanded®, Research Alert®, and Materials Science Citation Index®

Monthly, International Scholarly Journal, ISSN 1002-185X Vol. 46 No. 3 Sum 368 March 2017

Microstructure and Properties of AlCoCrFeNiB_x(*x*=0, 0.1, 0.25, 0.5, 0.75, 1.0) High Entropy Alloys

.....Chen Qiushi, Dong Yong, Zhang Junjia *et al* (651)

Influence of Ethylene Diamine Tetraacetic Acid on the Performance of Magnesia Supported Ru-based Catalysts for Ammonia

Synthesis.....Huo Chao, Cheng Xiangwei, Du Yanlei (657)

Influence of Microstructure Homogeneity on High-Cycle Fatigue Crack Initiation of Ti-55531 Alloy with Lamellar

Microstructure.....Huang Chaowen, Zhao Yongqing, Xin Shewei *et al* (663)

Nanoindentation Study on Mechanical Properties of Commercially Pure Ti Processed by ECAP

.....Liu Xiaoyan, Zhao Xicheng, Yang Xirong *et al* (669)

Friction and Wear Performance of Ti-12Mo Alloy by Powder Injection Molding

.....Zhi Lingling, Lu Xin, Sun Bo *et al* (675)

Effect of SO₂ on the Corrosion Behaviors of CoCrFeNiTi_{0.5} Alloy Anti-Alkali Metal Sulfate

.....Li Ping, Qin Peng, Pang Shengjiao *et al* (680)

Texture and Tensile Properties of Zr-Sn-Nb Alloy.....Zhang Fuquan, Ma Yongfu, Zhou Dianwu *et al* (687)

Evolution Characteristics of Microstructure of Ni-Based Alloy Coatings and Their Properties under Complex Process

.....Yang Xiaotian, Wang Pengchun, Li Xia *et al* (693)

Size Effect of High-Strength and High-Conductivity Cu-Nb Microcomposites

.....Liang Ming, Xu Xiaoyan, Wang Pengfei *et al* (699)

TEM Characterization and Performance Analysis of Ultrafine/Nanostructured WC-10Co-4Cr Coating

.....Wang Xuezheng, Wang Haibin, Song Xiaoyan *et al* (704)

Effects of Hydrides on Fracture Behavior of N18 Zirconium Alloy during *in situ* Tension

.....Liu Jinyun, Pu Xia, Sun Chao *et al* (711)

Microstructure Characteristics of Mg-6Gd-2Y Alloy at Different States

.....Yang Zhong, Wang Zhanhua, Duan Hongbo *et al* (716)

Temperature Rise Effect of AZ31B Mg Alloy during Rolling.....Ding Yunpeng, Zhu Qiang, Ma Qingwu *et al* (722)

Microstructure and Crack Evolution Behavior of Mg-8.07Al-0.53Zn-1.36Nd Magnesium Alloy

.....Cui Xiaoming, Bai Pucun, Liu Fei *et al* (728)

First-principles of Phase Stability and Solubility of Al-RE (La, Y) Alloy

.....Wang Haiyan, Gao Xueyun, Zeng Jianmin *et al* (735)

Interfacial Bonding Mechanism of CuW/ZL101A Prepared by Solid/Liquid Diffusion Bonding

.....Deng Ying, Liang Shuhua, Zou Juntao *et al* (740)

Materials Technology

Microstructure and Mechanical Property of Biomedical Ultrafine-grained β -type Ti28Nb2Zr8Sn Bulk Alloys Fabricated

by Power Metallurgy.....Wang Fen, Li Xinxin, Yang Chao *et al* (747)

Effects of Aluminum Content on Microstructure and Compressive Properties of TiAl Alloy

.....Hao Yanjun, Liu Jinxi, Li Jianchong *et al* (754)

Microstructure and Tensile Properties of TC18 Alloys by Electron Beam Rapid Manufacturing

.....Huang Zhitao, Suo Hongbo, Yang Guang *et al* (760)

RARE METAL MATERIALS AND ENGINEERING

This publication is covered in SCI Expanded®, Research Alert®, and Materials Science Citation Index®
Monthly, International Scholarly Journal, ISSN 1002-185X Vol. 46 No. 3 Sum 368 March 2017

Fretting Wear Behavior of Ceramic Coating Prepared by Micro-arc Oxidation on TC4 Alloy
.....Li Kang, Fu Xuesong, Hu Jianjun *et al* (765)

One-Step Explosive Bonding Preparation of Titanium/Aluminum/Titanium Laminates with Three Layers
.....Fan Minyu, Guo Xunzhong, Cui Shengqiang *et al* (770)

Effect of Heat Treatment on Microstructure and Mechanical Behavior of Nb-35Ti-4C Alloy
.....Wei Wenqing, Liu Bingqiang, Jiang Junsheng *et al* (777)

Preparation of Nanocrystalline Ti-6Al-4V Alloy by Mechanical Alloying.....Wang Jiahui, Wu Chengling, Shi Qingnan (783)

Mechanical Properties and Hot-corrosion Resistance of Composite Coatings with Ni-P Chemical Deposition and
Ni-Co-Mn Electroplating.....Xi Xiaobo, Miao Hong, Jin Yifu *et al* (790)

Effect of Pre-Recovery on Microstructure and Properties of Al-11.5Zn-3.5Mg-2.3Cu-0.24Zr-0.0025Sr Aluminum Alloy
Extrusion Subjected to Solid Solution-T652 Treatment.....Xu Xiaojing, Jiang Wei, Deng Ping'an *et al* (796)

Preparation and Thermo-physical Properties of Gd³⁺/Ga³⁺ Co-doped Garnet-type Yb₃Al₅O₁₂.....Li Jiansheng, Liu Yanli (802)

Properties of Supersonic Plasma Sprayed WC-17Co Nano-coating.....Li Wanqing, Lin Tiesong, Song Chaoqun *et al* (807)

Effect of Y₂O₃ Addition on Interface Structure and Corrosion Resistance of Laser Additive Manufacturing on the Surface
of Al Alloys.....Wang Chenglei, Gao Yuan, Zhang Guangyao (812)

Preparation of AZO Thin Films by Magnetron Sputtering at Low Temperature and Their Textured Structures
.....Zhang Kuanxiang, Peng Shou, Yao Tingting *et al* (818)

Self-sacrificial Template-directed Synthesis of Porous MnCo₂O_{4.5} and Their Catalytic Performance for Thermal Decomposition
of Ammonium Perchlorate.....Li Gang, Zhang Wenyan, Chi Yudi *et al* (824)

Effect of Quenching Temperature on Transformation Mechanism of Carbides of M42
.....Liu Bowen, Lu Xin, Pi Ziqiang *et al* (829)

Influence of CNTs and Ti on the Microstructure and Mechanical Properties of W-Based Alloys
.....Zhang Yucui, Sha Jianjun, Wang Yongchang *et al* (835)

Preparation of Fuel Cell Pt/C Catalyst by a One-Step Microwave Organic Sol Method
.....Wu Yanni, Chen Zhisheng, Mo Zaiyong *et al* (841)

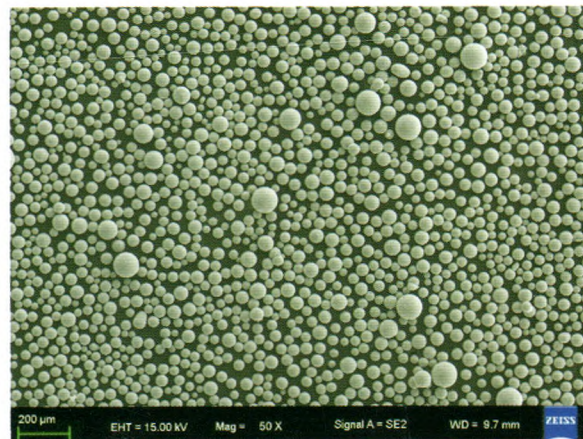
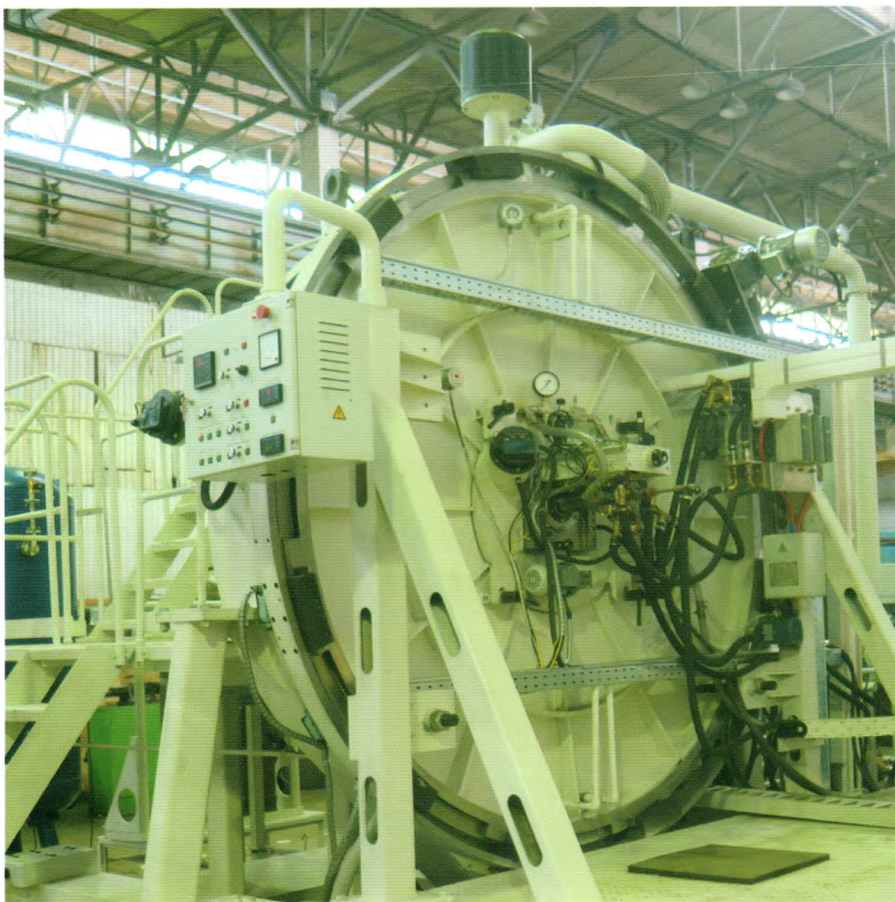
Preparation of TiO₂ Nanotubes on Foamed Titanium.....Cui Guang, Sun Jinxing, Liu Peisheng (847)

Fabrication of Diamond/Copper Composites by Hot Isostatic Pressing
.....Wang Fangyu, Wang Wenchao, Shi Ming *et al* (853)

Review

Vanadium-Based Alloy Membranes for Hydrogen Purification
.....Jiang Peng, Guangsheng Song, Daniel Liang *et al* (857)

Application of First-Principles in the Study of Ni₂MnGa Alloy.....Zhang Mingang, Sun Na, Guo Yanping *et al* (864)



西安欧中材料科技有限公司 Sino-Euro Materials Technologies of Xi'an Co., Ltd.

西安欧中材料科技有限公司隶属于西北有色金属研究院(集团),专业从事金属球形粉末生产的高新技术企业,注册资本6000万元。公司引进国外成套等离子旋转电极制粉生产线,获授权国家专利10余项,主要致力于钛合金、高温合金、钴铬合金、特种不锈钢及难熔金属球形粉末的研发、生产和销售,产品主要应用于航空航天、金属增材制造、生物医疗等领域。

西安欧中材料科技有限公司已被西安市认定为高新技术企业,通过ISO9001质量体系认证、AS9100航空航天质量管理体系认证、ISO13485医疗器械体系认证。

SMT PREP Powder Standard Spherical Powder Products

CP Titanium
Ti-6Al-4V Grade 5 & 23
Ti-6Al-4V 800ppm
BT20(TA15), Ti-6Al-7Nb
Maraging steel, Stainless steel
In625, In718, Hastelloy X
EP741NP
Co-Cr-W, Co-Cr-Mo

Customized Spherical Powder Products

Tantalum
Vanadium
TiAl, Ti₂AlNb
Specialty steel(AF1410, AeroMet 100)

地址: 陕西省西安市凤城二路45号

电话: 029-86261802

传真: 029-86261802

邮箱: market@c-semt.com

网址: www.c-semt.com

万方数据



ISSN 1002-185X
CN 61-1154/TG



03>