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ABSTRACT

MATERIALS SCIENCE RESEARCH AND DEVELOPMENT

THE STRUCTURAL CHARACTERIZATION OF THE DIFFUSION ZONE IN THE COMPOSITES WITH ALUMINUM MATRIX REINFORCED WITH COPPER THREADS

Florentina POTECAȘU, Octavian POTECASU

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Key words: composite materials, cold extrusion, copper, aluminum, mass transfer, interface zone.

Abstract: *The authors obtained through reverse extrusion an electroconductive composite Al-Cu, that can enlarge the exploitation area of aluminum in electrotechnics. The volumic percent of copper introduced as continuous threads in the aluminum matrix was of up to 27%. In the extrusion process the components have different deformations, as according to their own plasticity characteristics. As a result, improving the usage properties is realized by a convenient choice of the deformation degree, of the quantity and distribution reinforcing phase in the matrix and by applying some later thermal treatments, which can favorably influence the processes that take place in the limit zone among components. The size of this zone is modified as a result of the mass transfer that occurs during the extrusion process and especially during the thermal treatment. These steps of the obtaining process determine the kinetics and thermodynamics of the interface processes, so they have a determinant role on the final properties of the composite. The paper highlights the diffusion zone developed after the thermal treatment of*

annealing, of recrystallizing at the interface Al/Cu as an effect of the reverse current diffusion of the atoms of aluminum and copper, by metallographic analysis and electronic microsonde. In order to put lights on the diffusion phenomena from the interface the research were made on two series of samples: - one without thermal treatment, used as blank assay; - and one – samples treated at different temperatures (300⁰c, 400⁰c; 500⁰c) and different maintaining times (1, 2, 3, 4, 5, 6 hours) with thermal treatment.

THE STRUCTURE AND THE CRITICAL DEGREE OF COLD DEFORMATION FOR SHEETS OF STEEL WITH LOW CARBON

Florentina POTECAȘU, Octavian POTECAȘU

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Key words: deep drawing steel, thermal treatment, microstructure, critical deformation degree.

Abstract: *In the paper we present experimental results carried on a steel with 0.04%C and 0.25%Mn used in deep drawing. The research was done on samples taken from rolled straps, treated and skin passed. For comparison, control samples were used, they were taken from the steel strap before cold rolling (they were hot rolled). The thermal processing of the cold rolled samples was done in industrial conditions in a bell furnace. The microstructures revealed that the samples with low deformation degrees processed in industrial conditions have a high unevenness of the granulation along the section of the strap. At higher deformation*

degrees (above 32.5%) the granulation gets more and more even as the deformation degree increases. The critical deformation degree was found to be around 6.5%.

THE CORRELATION BETWEEN THE COLD ROLLING DEGREE AND THE MECHANICAL AND TECHNOLOGICAL CHARACTERISTICS FOR SHEETS OF STEEL WITH LOW CARBON

Octavian POTECAȘU, Florentina POTECAȘU

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Key words: drawing steel, mechanical characteristics, deformation degree, recrystallization

Abstract: In this paper we present the mechanical and technological characteristics of a steel with 0.04% C and 0.25% Mn used in deep drawing. The research was done on samples taken from rolled straps, treated and skin passed. For comparison, control samples were used, they were taken from the steel strap before cold rolling (they were hot rolled). The thermal processing of the cold rolled samples, having different deformation degrees $\epsilon = 2.2\%$, 6.5%, 15.2%, 32.5%, 50.0% , 60.0%, together with the control samples (without any cold rolling) was done in industrial conditions in a bell furnace. The samples were taken at angles of 0, 45 and 90 decimal degrees from the rolling direction. Using some higher cold deformation degrees than those strictly necessarily in deep drawing has the disadvantage that the mechanical resistance increases for the cold-hardened strap at values above 800 N/mm², which leads to higher energy consumption, accelerated wear of the plate rolls and difficulties in achieving the thickness and smoothness tolerances in of the strap due to using higher rolling forces. The research shows that lower degrees of

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deformation can be used to obtain some good characteristics for drawing, when using steels of high purity ($S_{max} = 0.009\%$, $P_{max} = 0.012\%$), demands easily obtained in the present industrial conditions.

DEVELOPMENT OF THE RAW MATERIAL BASE IN RESPECT TO THE TECHNOLOGICALLY AND CONCEPTUALLY ADVANCED STEELWORK

Anisoara CIOCAN, Florentina POTECASU, Liliana IVANCEA, João Pedro VEIGA

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Key words: valorisation, iron-bearing wastes, properties, sintering process.

Abstract: The paper presents the studies about the characteristics of the iron-bearing wastes generated by iron and steel making. All these were discussed in respect to the requirements for the wastes utilization as raw materials in the sinter process by converting the solid wastes into valuable iron-bearing resources. The wastes properties were analyzed in accordance with the origin and the processes that lead to their generation. There are morphology, mineral phases, chemical composition and physical properties: density, granulosity, calcinations losses, magnetic fraction, content of free CaO, metallurgical characteristic V_m , conductivity and the pH.

RESULTS OBTAINED BY DIFERENT MODE OF ACHIEVING HEAT TREATMENT OF ALUMINUM ALLOYS

Maria STOICĂNESCU, Ioan GIACOMELLI

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Key words: heat treatment, electromagnetic field.

Abstract: This paper presents the obtained results at ATSi5Cu1 alloy which

is casting and then heat treated, both in usual way and by applying an external magnetic field. Further, there have been effectuated also investigational electronic microscope.

CHEMICAL VAPOUR DEPOSITION TECHNIQUE USED FOR COATINGS – AN ASSESSMENT OF CURRENT STATUS

Mihai APREUTESEI, Ionela Roxana ARVINTE, Emilia BLAJ

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Key words: CVD technique, thin films, process, coatings, applications.

Abstract: *Chemical vapor deposition is a versatile deposition technique that provides a means of growing thin films of elemental and compound semiconductors, metal alloys and amorphous or crystalline compounds of different stoichiometry. The chemistry richness of a CVD process makes the technique so versatile and capable of producing a vast range of layers with different compositions, structures and properties. CVD is to be distinguished from physical vapour deposition (PVD), which also produces a thin film on a surface from the gaseous phase but without any chemical reaction. CVD processes for producing thin films and coatings have found increasing applications in technologies as the fabrication of solid-state electronic devices, the manufacture of ball bearings, cutting tools, production of rocket engine and nuclear reactor components. Because CVD processes do not require vacuum or unusual levels of electric power, they were practiced commercially prior to PVD. In this article the authors provide the basics definitions of CVD technique and some useful practical insights into CVD technology, of how microstructures evolve, and how CVD processes can be controlled to produce thin films tailored to practical needs.*

MORPHOLOGY OF ZINC MICRO-ALLOYED COATINGS

Tamara RADU, Florentina POTECASU, Rui Jorge CORDEIRO SILVA

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Key words: morphology, coating, „zinc flowers”, the surface quality, uniformity, texture, luminosity.

Abstract: *The surface morphology of the zincked sheets is formed after the solidification of the melted metal, carried along the carrier strap during its extraction of the zincking bath. This surface layer is dependent on the fluidity of the melting, on its superficial tension and on the solidification characteristics according to the chemical composition of the melting. The elements of microalloying can improve the surface quality of the zincked steel by: uniformity, texture, luminosity. Depending on the combination elements of microalloying the surface can have different types of metallic layers with an important effect on the coating morphology. The research made revealed the important effect it had at microalloying with Al, Sn, Bi, Pb on the coating layer's morphology.*

INFLUENCE OF STRUCTURAL STATE ON CAVITATIONAL EROSION OF MARTENSITIC STAINLESS STEEL GX4CrNi13-4, HEAT TREATED

Ioan PĂDUREAN, Ilare BORDEAȘU

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Key words: cavitation erosion, nitriding, structural analyses, thermal treatment, microstructure.

Abstract: *Samples of the martensitic stainless steel GX4CrNi13-4 have been thermally treated and tested under cavitation erosion. Were obtained cavitation erosion resistance increases due to structural changes. There were hardness and microstructure analysis. Showed how*

steel structure influence on mass loss by cavitation.. The thermal treatment of quenching, high tempered followed by nitrating give a high cavitation erosion resistance to martensitic stainless steel GX4CrNi13-4. In conclusion, the mechanisms resulting in cavitation and destruction that has significant impact on the structural state on the cavitation behavior of martensitic steel.

CONTRIBUTIONS TO THE MICROSTRUCTURAL CHANGES INDUCED BY HEAT TREATMENT OF Ti-6Al-4V DEFORMABLE ALLOY
Ion MITELEA, Marcela Elena DIMIAN, Ilare BORDEAȘU

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Key words: microstructure, hardness, solution treatment, aging.

Abstract: *The paper analyzes the microstructural changes occurring in two-phase alloy Ti-6Al-4V by changing solution treatment temperature between 810 ° C and 1050 ° C with cooling water or air, followed by aging at 550 ° C. The micrographic investigations and sclerometry examinations highlighted features of martensitic transformation hardening mechanism and the precipitation of secondary phases during the aging treatment.*

ENVIRONMENTAL ISSUES

THE BUSINESSES AND THE ENVIRONMENT

Robert-Ionut DOBRE

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Key words: Environment, business, social responsibility, environmental laws.

Abstract: *In almost entire civilized world there is an emerging consensus about respecting the environment and an increasing level of the sound of voices that sustain that companies have social and*

environmental responsibilities. But not always it was the same thing. Great economic and political personalities sustained that this issue is of secondary importance for our business. Nowadays, the idea of including environmental protection among the production factors, near capital and human resources has more and more followers.