Research paper

Materials

Properties

Methodology of research

Selected materialographical photo

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The research paper made by J. Stobrawa, Z. Rdzawski, W. Głuchowski and W. Malec on "Ultrafine grained strips of CuCr0.6 alloy prepared by CRCS method" on a **page 166** describes the evaluation of the ability of a continuous repetitive corrugation and straightening (CRCS) technique in creating ultra fine grained copper-chromium strips as well as to determine their deformability, mechanical properties, deformation behaviour and microstructure evolution. Research results are limited to the initial material after annealing only. Further investigations should be aimed towards determination of CRCS sequence including deformation-precipitation-ageing influence on strengthening effect. A growing trend to use new copper-based functional materials is observed recently world-wide. Within this group of materials particular attention is drawn to those with ultra fine or nanometric grain size of a copper matrix, which exhibit higher mechanical properties than microcrystalline copper. The paper describes the mechanical properties of precipitates strengthened ultra fine grained copper – chromium alloy strips obtained by original RCS method and to the microstructure evolution.

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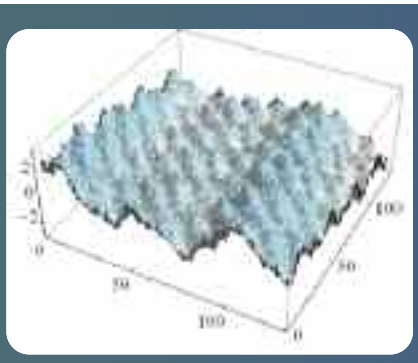
The paper written by R.A. Gonzaga, P. Martínez Landa, A. Perez and P. Villanueva on "Mechanical properties dependency of the pearlite content of ductile irons" on a **page 150** presents a comparison of different pearlite contents in pieces with similar shape and dimensions and to analyse the variation of mechanical properties as pearlite content increases. The three used pieces had form of stair made of ductile cast iron. The present study was based on an adequate balance of alloying elements. None heat treatment was used to obtain different pearlite contents in the microstructures. Many specimens taken from the cast were mechanized to be polished and swabbed with nital to analyse the microstructure. To study the mechanical properties these casts present many tests were done such as Charpy impact test, done at different temperatures. Fracture toughness and tensile strength tests were done, as well. Cast iron productions are focused straight on machine building and automotive industries and constructions. The low cost production of ductile cast iron, its mechanical properties and low cost transformations are the tempting for application. The whole experimental work and the appropriate results obtained as consequences of the analysis carried out are novel, although applied methods are well known. Values presented in tables are given as new results of our experiments. This work is of great importance for the development of new economical methods for ductile iron production. This study is directed to researchers and metallurgy centres.



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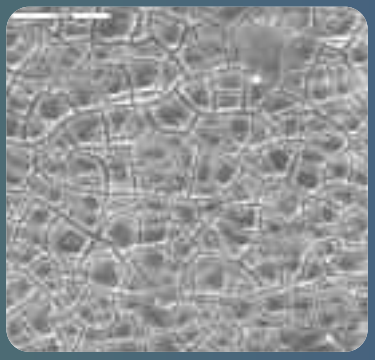
The paper entitled "A modification of the method for determination of the surface fractal dimension and multifractal analysis" by W. Kwaśny on a **page 155** demonstrates the modification of the PCM method for determination of the surface fractal dimension. Three different algorithms to receive data sets describing surfaces with fractional fractal dimension were exploited (two algorithms of midpoint displacement and Falconer algorithm). In a presented work modified PCM method for determination of the surface fractal dimension was proposed. Performed calculations proved that new method enable to determine this parameter more correctly. Differences are especially significant for rough surfaces, as what tested using series of data sets generated by algorithms for modelling surfaces with fractional fractal dimension. A proposed modified method for determination of the fractal dimension can be used for the description of the geometrical features of coatings obtained in the PVD and CVD processes. Fractal and multifractal analysis gives possibility to characterise the extent of irregularities of the analysed surface in the quantitative way.



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The properties area section represented by M. Opiela, A. Grajcar and W. Krukiewicz on "Corrosion behaviour of Fe-Mn-Si-Al austenitic steel in chloride solution" on a **page 159** presents the corrosion behaviour of the new-developed high-manganese austenitic steel in 0.5n NaCl solution. The steel used for the investigation was thermomechanically rolled and solution heat-treated from a temperature of 850°C. Corrosion resistance of investigated steel was examined using weight and potentiodynamic methods. In the weight method, the specimens were immersed in the prepared solution for 24h. In the potentiodynamic method, anodic polarization curves with a rate of potential changes of 1 mV/s in the anodic direction were registered. After the current density being equal 1 mA/cm^2 was achieved, the direction of polarisation has been changed. Basing on the registered curves, the pitting potential, repassivation potential, polarization resistance and corrosion current were determined. To investigate in more detail the corrosion behaviour of high-manganese steel, the investigations should include steels with a wider Al concentration. The obtained results can be used for searching the appropriate way of improving the corrosion resistance of a modern group of high-manganese austenitic steels.

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