



Materials

7. Photoalignment – an alternative aligning technique for Liquid Crystal Displays

M.M. Chrzanowski, J. Zieliński, M. Olifierczuk, J. Kędzierski, E. Nowinowski-Kruszelnicki (Poland)

14. New organic electrochromic materials and their applications

J. Żmija, M.J. Małachowski (Poland)



Properties

24. Synthesis and characteristics of optical properties of crystalline $YAl_3(BO_3)_4:Cr,Ce$

I. Cieślík, J. Żmija, A. Majchrowski, M. Pępczyńska, P. Morawiak, M. Włodarski (Poland)

29. Properties of alumina ceramics obtained by conventional and non-conventional methods for sintering ceramics

P. Figiel, M. Rozmus, B. Smuk (Poland)

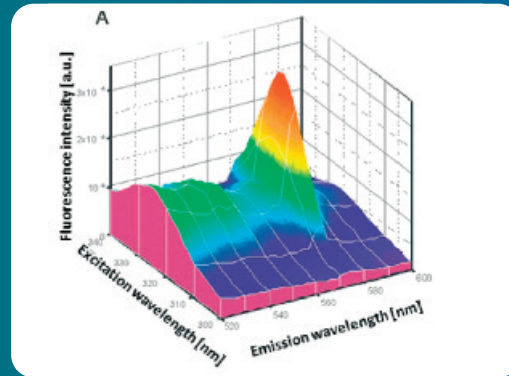
35. The selection of phase composition of silicon nitride ceramics for shaping with the use of EDM machining

P. Putyra, J. Laszkiewicz-Łukasik, P. Wyżga, M. Podsiadło, B. Smuk (Poland)

41. Determination of the thermodynamic properties of liquid Ag-Sb-Sn system by equilibrium saturation method

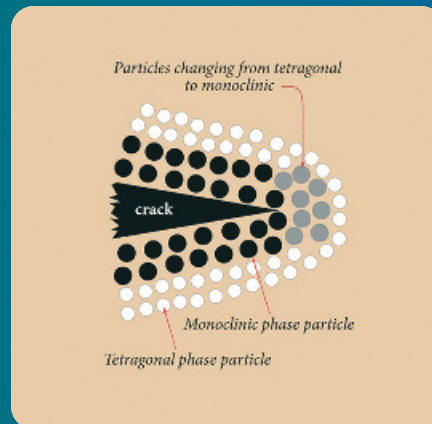
J. Romanowska (Poland), L. Bencze (Hungary)

24

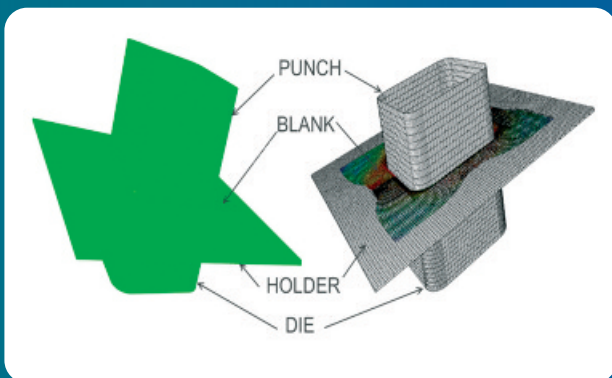


In the paper entitled "Synthesis and characteristics of optical properties of crystalline $YAl_3(BO_3)_4:Cr,Ce$ " by I. Cieślík, J. Żmija, A. Majchrowski, M. Pępczyńska, P. Morawiak and M. Włodarski on a page 24 the possibility of control the grain size of YAB nanopowder and to investigate the optimum amount of dopant cerium or chromium ions in the matrix of YAB for luminescent intensity is presented. Nanocrystalline samples of YAB were prepared by sol-gel method and calcination at 1273 K. The structure and morphology of nanopowders were investigated by X-ray diffraction (XRD), scanning electron microscopy (SEM) and aerodynamic aerosol aerodynamic methods. Fluorescent intensity was measured by Fourier transform infrared (FTIR) and intersection of three-dimensional matrix (EM-EX) methods. Single phase crystalline YAB synthesis was developed. The measurements XRD confirmed that doping of YAB with some of RE or TM ions favours the formation of additional phase YBO_3 having the organic structure. It was confirmed that the mean size of the obtained particles depended on the chain length of the precursor polymer used for reaction. The luminescence of YAB doped with cerium and chromium ions was measured.

58

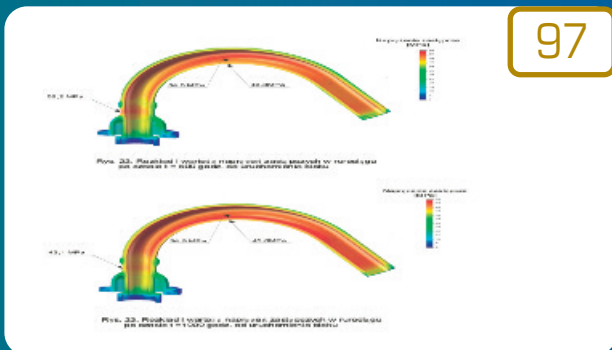


The Properties area is shown in the paper on "Selected mechanical properties and microstructure of $Al_2O_3-ZrO_2$ nanoceramic composites" by M. Szutkowska, B. Smuk, A. Kalinka, K. Czechowski, M. Bućko and M. Boniecki on a page 58. The present study reports selected properties obtained by reinforcing Al_2O_3 with 15 wt% ZrO_2 (partially stabilized with Y_2O_3 -Y5) and, non-stabilized zirconia. Specimens were prepared based on submicro- and nano-scale trade powders. Vicker's hardness ($HV1$), wear resistance and fracture toughness (K_{IC}) at room and elevated temperatures characteristic for tool work were evaluated. Microstructure was observed by means of a scanning electron microscopy (SEM). Preliminary industrial cutting tests in the turning of higher-quality carbon steel C45 grade were carried out. The addition of nanopowders does not result in a significant improvement in fracture toughness at room temperature. A reduction in fracture toughness of $K_{IC(ET)}$ by approximately 20% is observed at elevated temperature (1073K) for the specimen only with submicro powders in comparison to those at room temperature. An addition of the powder mixture in submicron and nano scale size reveals the minor reduction of fracture toughness (up to 10%) at elevated temperature. The results show that using of powders in submicron and nano scale size not improve the tool life but influences the fracture toughness et elevated temperatures. The results of the presented investigations allow for a rational use of existing ceramic tools.



64

The paper written by F. Ayari and E. Bayraktar on "Parametric Finite Element Analysis for a square cup deep drawing process" on a **page 64** discusses a problem in the two parts, the first part is a study of numerical parametric investigation that deals with the most influent parameters in a forming process to simulate the deep drawing of square cup (such as geometric parameters and coefficient of friction). The second part of this paper deals with a mono objective optimization study. In fact, the application of optimization techniques to a variety of metals requires much expertise in this field. Unfortunately, most professionals in the forming process, lack this expertise, which is an obstacle to fully exploit the potential of optimization process of metal forming structures. In this study an optimization approach is used to improve the final quality of a deep drawn product by determining the optimal values of geometric tools parameters. The friction coefficients between the sheet metal blank and the different tools have a great influence on the development process and the product quality. Taking into account these considerations as well as the normal and tangential interactions due to contact between tools and sheet metal, a finite element model was built using the commercial FE code Abaqus. This model is used with conjunction with optimisation tool to classify geometric parameters that participate to failure criterion. The failure criterion that was used in this study is the thinning in a deep drawn sheet metal, along a particular critical path.



97

The paper entitled "Effect of creep characteristics on pipeline durability" by K. Mutwil on a **page 97** shows an assessment of durability of a steam pipeline operating above the threshold temperature. The durability calculations take into account the creep characteristics of the material. Due to the lack of data regarding objects operated for a long time, the calculations of their durability made under this study provide preliminary information on the expected further operational life of a specific structural element. The comprehensive evaluation of the life of an object should be supplemented by research on the material to enable determining the actual degree of material wear in the areas of the analyzed element subject to the highest effort. In the calculations of wear caused by creep, carried out in line with the EN-13480 standard, the criterion is the stress in the wall of a component under internal pressure. The paper presents the results of stress calculations while taking into account additional operational load, which has a significant influence on the degree of material wear. As a result of the made calculations, the effect of redistribution and relaxation of stresses induced by the initial guy wire tension has been found. This leads to a rapid loss of stresses, the consequence of which is enhanced durability of the investigated object. To ensure operational safety of pipelines operated for a long time, a method is presented to evaluate their durability, which takes into account the effect of additional loads on the effort of the pipeline.

52. The influence of reinforcing particles on mechanical and tribological properties and microstructure of the steel-TiB₂ composites

I. Sulima, L. Jaworska, P. Wyżga,
M. Perek-Nowak (Poland)

58. Selected mechanical properties and microstructure of Al₂O₃-ZrO_{2nano} ceramic composites

M. Szutkowska, B. Smuk, A. Kalinka, K. Czechowski,
M. Bućko, M. Boniecki (Poland)



Analysis and modelling

64. Parametric Finite Element Analysis for a square cup deep drawing process

F. Ayari (Tunisia), E. Bayraktar (France)

87. Impact of the chirping effect on charged particle acceleration in laser radiation

M.J. Małachowski, A. Dubik (Poland)

97. Effect of creep characteristics on pipeline durability

K. Mutwil (Poland)

103. Author index

104. Keywords index

105. Publisher's notice

106. Editor's notice