Serbian Ceramic Society Conference
ADVANCED CERAMICS AND APPLICATION X
New Frontiers in Multifunctional Material Science and Processing

Serbian Ceramic Society
Institute of Technical Sciences of SASA
Institute for Testing of Materials
Institute of Chemistry Technology and Metallurgy
Institute for Technology of Nuclear and Other Raw Mineral Materials

PROGRAM AND THE BOOK OF ABSTRACTS

Serbian Academy of Sciences and Arts, Knez Mihailova 35
Serbia, Belgrade, 26-27. September 2022.

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combinations of strength toughness and low temperature degradation resistance. Stabilizers may either be single rare earth oxides or combinations of oxides with larger and smaller trivalent cations.
By proper selection of starting powders, powder processing and sintering off-equilibrium TZP materials featuring grains with a core-shell structure can be created. The over-stabilized shell ensures good LTD resistance, the under-stabilized core ensures high transformability, transformation efficiency and toughness. Such materials are highly attractive for the biomedical filed but also as a matrix material for e.g. electric discharge machinable composite ceramics with an electrically conductive second phase.

INV3

Quantifying acidity and basicity of oxides: a calorimetric approach

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Given the great many applications of heterogeneous acid-base catalysis, the acidity and basicity of solid oxide catalysts (non-porous, such as ceria, zirconia or titania, or porous, such as zeolites) are considered crucial, among various characteristics which influence their performance. Namely, the concentration of acid/basic sites, their nature and their strengths are the most important parameters. Different methods are routinely being applied in the study of acidity/basicity, most often infrared spectroscopy and temperature programmed desorption. However, in terms of exact quantitative data on acidic/basic site strength distributions, a calorimetric method stands out as exceptional. It is designed to simultaneously record adsorption isotherms of basic (NH_3) or acidic (SO_2) probe molecules and the related thermal effects, via coupling of a calorimeter and a calibrated volumetric line equipped with pressure gauges. Microcalorimetric-volumetric measurements of adsorption yield several sets of results: the total number of sites (μmol/g), the concentration of irreversibly adsorbed probe molecules (number of “strong” sites, μmol/g), integral heats of adsorption (J/g) and differential heats of adsorption (kJ/mol), i.e. the distribution of strengths of the acid/basic sites. Examples of these unique results, which provide a fully quantitative image of acidity/basicity of oxide materials, unparalleled by any other technique, will be presented.