Supplementary information S1

As has been highlighted in the paper, the number of publications in ZnO based systems are enormous. The publications listed below are exclusively intended to summarize the work done in the last years by the authors in this topic. The references included constitute a good and extensive bibliographic revision.

ZnO doped with Transition elements

Localized luminescence in ZnO:Mn ceramics; Appl. Phys. A46 (1988)1-3

Fe solubility, growth mechanism and luminescence of Fe doped ZnO nanowires and nanorods grown by evaporation-deposition; J. Appl. Phys. 110 (2011)014317

Nanowires and stacks of nanoplates of Mn doped ZnO synthesized by thermal evaporation-deposition; Materials Chemistry and Physics 132 (2012) 1119-1124

From spent alkaline batteries to $Zn_xMn_{3-x}O_4$ by a hydrometallurgical route: synthesis and characterization; RSC Advances 8, 33496-33505 (2018) DOI: 10.1039/c8ra06789a

Influence of yttrium doping on the structural, morphological and optical properties of nanostructured ZnO thin films grown by spray pyrolysis; Ceramics International 45 (6) (2019) 6842-6852

Enhanced UV emission of Li-Y co-doped ZnO thin films via spray pyrolysis; Journal of Alloy and Compounds Volume 808, 5 November 2019, 151710

Growth and characterization of ZnO micro- and nanostructures doped with cerium for application in photocatalysis processes; Journal of Alloys and Compounds (doi.org/10.1016/j.jallcom.2019.153146

Fabrication and Characterization of ZnO: CuO composites for their application in >> sensing processes; IEEE Sensors Journal, vol. 21, no. 3, pp. 2573-2580, 1 Feb.1, 2021, doi: 10.1109/JSEN.2020.3024949

Optical spectroscopy characterization of Cu doped ZnO nano- and microstructures grown by vapour-solid method; Journal of Alloys and Compounds, 687 (2016) 161

Study of the influence of the precursors on the sensing properties of ZnO:Cu system; Ceramics International (doi.org/10.1016/j.ceramint.2019.12.068

Vapour-Solid growth of ZnO:ZrO_2 micro and nanocomposites; (2021) Journal of Alloys and Compounds, 877, art. no. 160219

ZnO doped with Rare earth elements

Growth and cathodoluminescence of Eu doped ZnO nanoneedles and branched nanoneedle structures; Journal of Nanoscience and Nanotechnology, 10 (2010) 502-507

Growth and characterization of Er doped ZnO elongated nanostructures; Physica status solidi (a) 208 (4)(2011) 868-873

Luminescence and waveguiding behaviour in Tb doped ZnO micro- and nanostructures; Journal of Alloys and Compounds 610 (2014) 416-421

Synthesis and Characterization of ZnO Nanoparticles with Controllable Ce Content for Efficient Photocatalytic Degradation of MB; Catalysts 2021, 111(1) doi:10.3390./catal11010071

Morphology, luminescence and optical properties of Tb- and Li- codoped ZnO elongated nano- and microstructures; Phys. Status Solidi A 2022, 219, 2100805; DOI: 10.1002/pssa.202100805

Characterization, luminescence, and optical resonant modes of Eu-Li codoped ZnO nano- and microstructures; Applied Sciences 12 (2022)6948

Effect of lithium codoping on the structural, morphological and photocatalytic properties of Nd-doped ZnO, Ceramics International https://doi.org/10.1016/j.ceramint.2023.07.24

Luminescence and light guiding properties of Er and Li codoped ZnO nanostructures; Journal of Luminescence 195 (2018) 396-401

Fast growth of undoped and Sn and Tb doped ZnO nanowires; Crys. Eng. Comm 20, 4449-4454 (2018)

In-depth structural and optical analysis of Ce-modified ZnO nanopowders with enhanced photocatalytic activity prepared by microwave assisted hydrothermal method; Catalysts 2020, 10(5), 551

ZnO doped with elements of group II and VI

Sn and Mg doped ZnO nanowires and nanoplates; Chemistry and Application of Nanostructures: Reviews and Short Notes: 368-371 (2007)

Growth and luminescence of nanowires and oriented nanoplate arrays in Mg doped ZnO; Journal of Nanoresearch 4(2008) 27-32

Cathodoluminescence study of Te-doped ZnO microstructures grown by a vapour-solid process; Journal of Materials Science 43 (2008)2844-2888

Cathodoluminescence characterization of ZnO:Te microstructures obtained with ZnTe and TeO2 doping precursors; Superlattices and microstructures 43(5-6)(2008)600-604

Recombination processes in Te-doped ZnO microstructures; Physica status solidi (b) 251 (3) (2014) 683-688 (DOI 10.1002/pssb.201248600)

ZnO doped with elements of group III

Al doped ZnO nanoplate arrays and microbox structures grown by thermal deposition; Journal of Applied Physics 105 (5) (2009) 054315

Self-assembled three-dimensional Al doped ZnO nanorod networks; Semicond. Sci. Technol. 26 (2011) 085035

Complex hierarchical arrangements of stacked nanoplates in Al-doped ZnO; Phys. Status Solidi A, 1–6 (2012) / DOI 10.1002/pssa.201228081

Luminescence and Raman study of Zn4In2O7 nanobelts and plates;Superlattices and Microstructures 56 (2013) 1–7

Growth and luminescence of oriented nanoplate arrays in tin doped ZnO; Nanotechnology 18 (2007) 115606

Self-assembled tin-doped ZnO nanowire and nanoplate structures grown by thermal treatment of ZnS powder; Journal of Crystal Growth 311 (11) (2009) 3231-3234

Indium-zinc-oxide nanobelts with superlattice structure; Applied Physics Letters 95(1)(2009)013111

ZnO doped with elements of group IV

Voids, nanochannels and formation of nanotubes with mobile Sn fillings in Sn doped ZnO nanorods;Nanotechnology, 21 (2010) 225604

In situ TEM and analytical STEM studies of ZnO nanotubes with Sn cores and Sn nanodrop; J. Phys D 46 (2013) 395301

In-situ transmission electron microscopy study of melting and diffusion processes at the nanoscale in ZnO nanotubes with Sn cores; Journal of Alloys and Compounds 744 (2018) 421-425

ZnO doped with elements of group V

Thermal growth and cathodoluminescence of Bi doped ZnO nanowires and rods; Journal of Physics D-Applied Physics 42(22)(2009)225101

ZnO doped with alkaline elements

Study of the influence of dopant precursor on the growth and properties of Li- doped ZnO; Journal of Physics and Chemistry of Solids 139, 109354 (2020)

Evolution of whispering gallery modes in Li doped ZnO hexagonal micro- and nanostructures; Appl. Sci. 2020, 10, 8602;>> doi:10.3390/app10238602

Optical properties of 2D micro-and nanostructures of ZnO:K; Materials 15 (2022)77338

Supplementary Information S2

According to the data presented in this work (extracted from Web of Science Data Base), in the period 1920-1939, the works published on ZnO appeared categorized in six different areas, already en the next period considered (1940-1959) ten areas were already listed. Not only the number of categories but also the categories themselves are a clear indication of the potential and versatility of this material and may serve to follow the upraise of new applications. In supplementary information files S2 are included the graphs with the distribution of published papers from 1900 to the date. Besides those that could be considered basic areas as Physics of Condensed Matter, Materials Science or Chemistry Physical, in the period 1940-1979, areas Materials Science Ceramics accumulate a good number of publications. This is the period in which many of the basic studies on varistors were done. In the last two periods considered, Physics Applied and Materials Science Multidisciplinary accumulate the largest number of publications, however, Nanoscience and Nanotechnology (always restricted to ZnO) reaches more than 15000 papers, and the areas more closely related to technological applications and Electrical Engineering and Electronics of Fuel Energy are also relevant. It is also interesting to observe that during the first periods considered the areas accumulating the largest number of papers were closer to Chemistry (Chemistry Multidisciplinary and Chemistry Physical) evolving to areas closer to Physics (Physics Applied or Physics Condensed Matter) to finally observe Materials Science Multidisciplinary as the most prominent area, reflecting the ever more diffuse frontier between Physics and Chemistry.

Figures S1 to S7 show the distribution of publications among the areas according to Web of Science Data Base. They are grouped in periods of 20 years from 1900 to date.

Figure S1.- Period 1900-1919

Figure S2.- 1920-1939

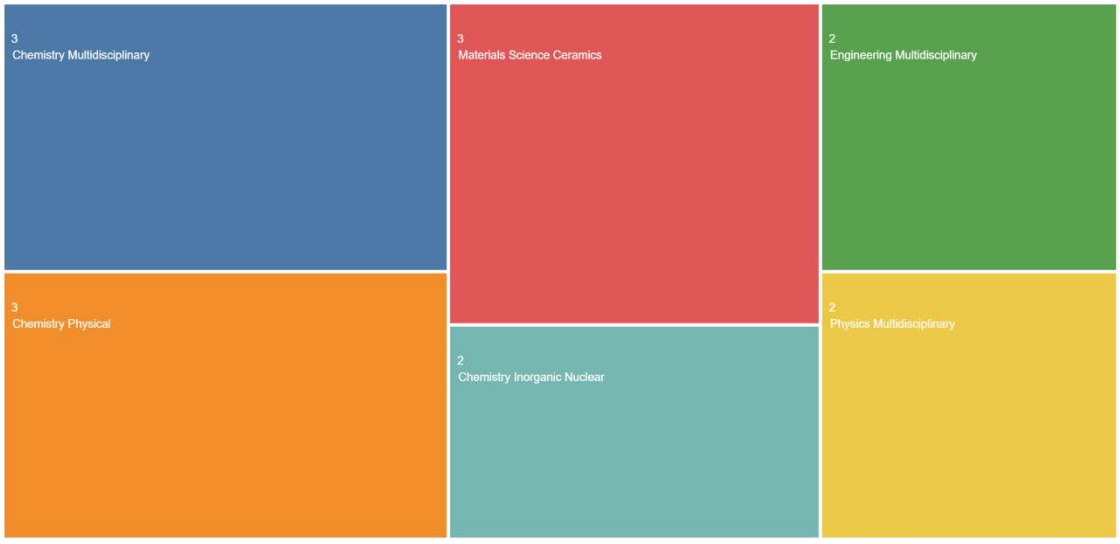

Figure S3.- 1940-1959

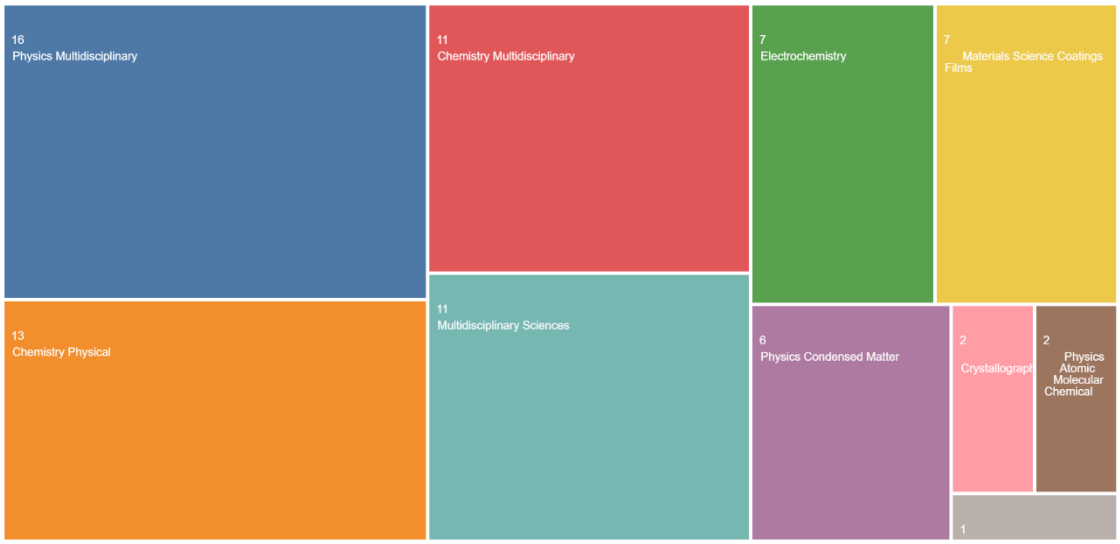

Figure S4.- 1960-1979

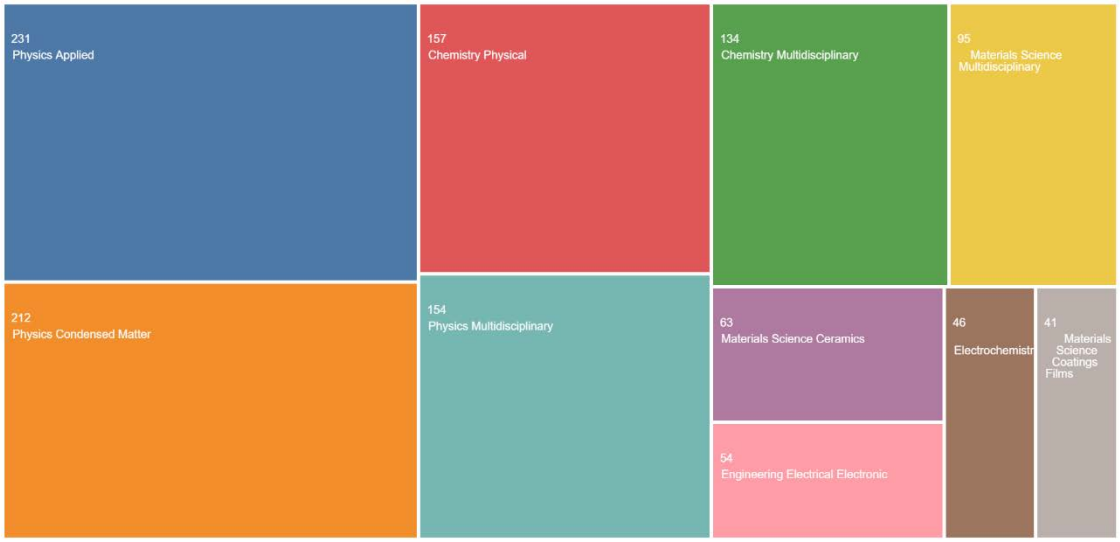

Figure S5.- 1980-1999

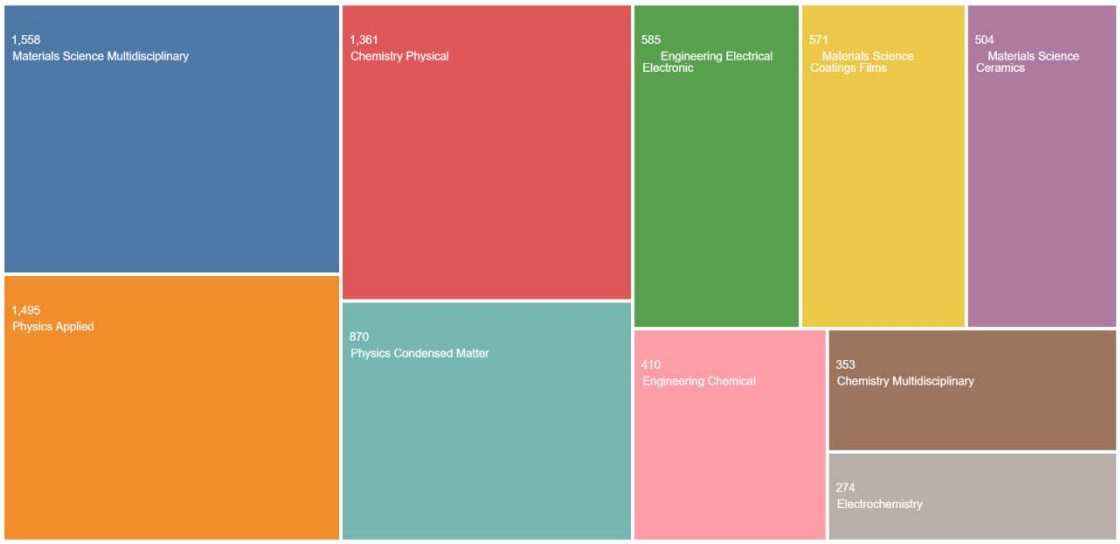

Figure S6.- 2000-2019

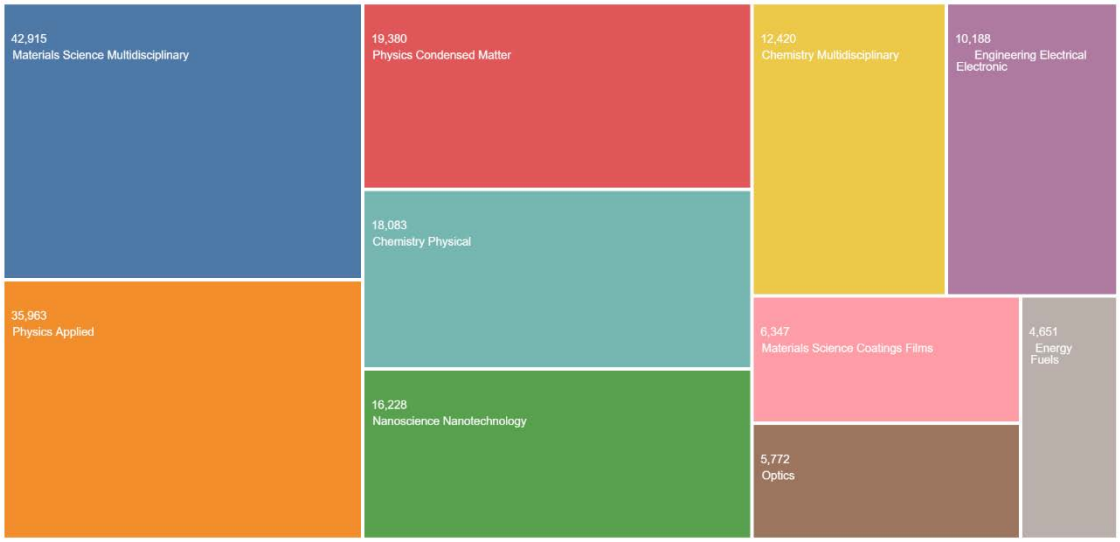

Figure S7.- 2020-