IBS Center for Multidimensional Carbon Materials

Tuesday Colloquium

Dr. Yogendra Kumar Mishra

Group Leader: Functional Nanomaterials Chair
Institute for Materials Science
Kiel University in Germany

ykm@tf.uni-kiel.de

Flame Inspired Nanostructuring: Soft Ceramics to Advanced 3D Nanocarbons

Tuesday, AUG 29
4 PM

Bldg. 101
Seminar room on the 1st floor

The recently introduced flame transport synthesis method offers unique nanostructuring avenues for different metal oxides ranging from quasi 1D nanowires to porous 3D interconnected ceramics networks.[1] This flame based strategy allows direct integration of ZnO nano- and microstructures and their interconnected networks on the desired substrates for various applications, e.g., whispering gallery modes, photocatalysis or nanosensing (UV/gases), and piezotronic devices, etc.[1-5] The unique 3D shape of the ZnO tetrapods facilitates them to be used as efficient fillers for fabricating advanced composites, e.g., self-reporting/healing composites[6] and many others. The 3D porous, flexible and conducting network from ceramic materials are now-a-days very important because of their technological relevance and the developed flame method offers desired synthesis of various ZnO and SnO2 nanonetworks.[1] The flame grown ZnO tetrapods structures exhibit very low cytotoxicity and they have shown strong potentials against antiviral and in other biomedical applications.[7] These porous networks can be decorated with other nanomaterials for designing further hybrid multifunctional materials[2] and can also be used as sacrificial templates to grow new nanomaterials from carbon, for example 3D Aerographite and CNTT networks.[8-10] An overview about the new possible nanostructuring opportunities by the flame method will be briefly presented including some application examples.

References:
[1]Particle & Particle Systems Characterization 30, 2013, 775-783
[2] Advanced Functional Material 27, 2017, 1604676
[3]ACS Applied Materials & Interfaces 7, 2015, 14303–14316
[4]Advanced Materials 26, 2014, 1541-1550
[5] ACS Omega 2, 2017, 2985-2993
[6] Advanced Materials 25, 2013, 1342-1347
[7] Journal of Immunology 196, 2016, 4566-4575
[8] Advanced Materials 24, 2012, 3486-3490
[9] Nature Communications 8, 2017, 14982
[10]Nature Communications 2017 (Under Review)

You are cordially invited to attend!