COINAPO
COMPOSITE MATERIALS OF INORGANIC NANOTUBES AND POLYMERS

3rd Composites of Inorganic Nanotubes & Polymers Topical Meeting

Inorganic nanomaterials and their composites: from fabrication to applications

2nd – 3rd of March 2011

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Program

Wednesday 2.03.2011

14:00	Registration		
15:45	Welcome	Opening of the conference by Prof. Pierluigi Civera, Director of Smart Materials Platform, IIT@PoliTO	
	Piezoelectric nanostructures and composites: fabrication, characterization and applications **Chair: Dr. Jinhui Song**		
16:00	Song*	Piezoelectric nanogenerator by n- and p-type nanowires	5
16:30	Cauda	Distributed array of polymeric piezo-nanowires trough hard-templating method	7
16:45	Fruth	Preparation and characterisation of ZnO nanotube by the hydrothermal method on Si and glass substrates	9
17:00	Dahiya	Influence of temperature on polarization of piezoelectric polymers	11
17:15	Noberi	Synthesis and characterization of nano-size Ag and ZnO particles	13
17:30	BREAK		
	Characterization **Chair: Prof. Irena Drevenšek-Olenik**		
18:00	Lamedica*	AURIGA® Crossbeam® information beyond the resolution	15
18:30	Schranz	Dynamic mechanical analysis of organic and inorganic nanotubes – elastomer composites	17
18:45	Torre	Investigation of elastic, thermal and viscoelastic dynamics of composites by transient grating experiments	19
19:00	Alexandrou	Using aberration corrected microscopy for studying nanomaterials	21
19:15	Racolta	Nanomaterials studies using nuclear methods at IFIN-HH	23
19:30	Samulionis	Ultrasonic characterization of dynamic elastic properties of polymer network composites with inorganic nanotubes	25
19:45	END		

Thursday 3.03.2011

	Nanostructures and composites based on chalcogenides and silver – I **Chair: Prof. Wolfgang Tremel**		
8:30	Tremel*	Complex nanostructures from layered metal chalcogenides	27
9:00	Drevenšek-Olenik	Effect of $Mo_6S_xI_{10-x}$ nanowires addition on electrooptic properties of polymer-dispersed liquid crystals	29
9:15	Sinatra	Synthesis methods for a progressive bundle size reduction in MoSI nanowires	31
9:30	Petzlet	THz and microwave dielectric spectroscopy of MoSI nanowire films and polymer composites	33
9:45	Zavickis	Conductivity percolation investigation of polymer/nanostructured conductive filler composites with sensing properties	35
10:00	BREAK		
	Nanostructures and composites based on chalcogenides and silver – II **Chair: Dr. Johan G. Meier**		
10:30	Pizzi*	Examples of nanotechnology implementation in automotive and household appliance components	37
11:00	Romiszewski	Functionalization of WS_2 nanoparticles mechanism of nanotubes orientation in SEBS composite with cylindrical structure	39
11:15	Zak	The effect of WS_2 nanotubes on the properties of epoxy based nanocomposites	41
11:30	Lotya	Liquid phase exfoliation of layered inorganic materials	43
11:45	Irusta	Silver nanowires as potential filler for conductive nanocomposites: synthesis and characterization	45

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Conductivity percolation investigation of polymer/nanostructured conductive filler composites with sensing properties

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According to previous research, nanostructured carbon composites are positioned among others as promising materials to partially replace conventional rigid pressure sensitive materials [1, 2]. To understand the basic principles of nanostructured conductive composites, the percolation behaviour should be carefully examined.

In this work we have investigated the electrical percolation behaviour of polymer/nanostructured conductive filler composites, depending on filler type and different dispersing techniques used. The extra conductive carbon black, multiwall carbon nanotubes and $Mo_3S_2I_8$ nanowires were used as fillers in polyisoprene matrix. Different dispersing techniques, including mechanical mixing, solution mixing and ultrasonication were used to distribute conductive filler within matrix. The DC and AC conduction properties of these composites have been evaluated.

Remarkable shift of the DC percolation threshold was obtained for carbon black filled composites, by substituting mechanical mixing with ultrasonication in chloroform solution. The polyisoprene - $Mo_3S_2I_8$ nanowire composite did not possess DC conductivity, but instead AC measurements revealed potential percolation characteristics of such composite.

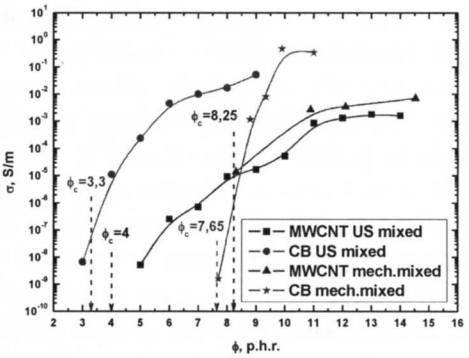

Fig.1. The determinated critical concentration of the DC electrical percolation for different polyisoprene – nanostructured carbon composites

References

1. M.Knite, V.Teteris, A.Kiploka, J.Kaupuzs, Sensors & Actuators-A, 110, 142 (2004)
2. M.Knite, K.Ozols, J.Zavickis, V.Tupureina, I.Klemenoks, R.Orlovs, Journal of Nanosciences and Nanotechnology, 9-6, 3587 (2009)