Electrical Properties of Insulator-Conductor Composites

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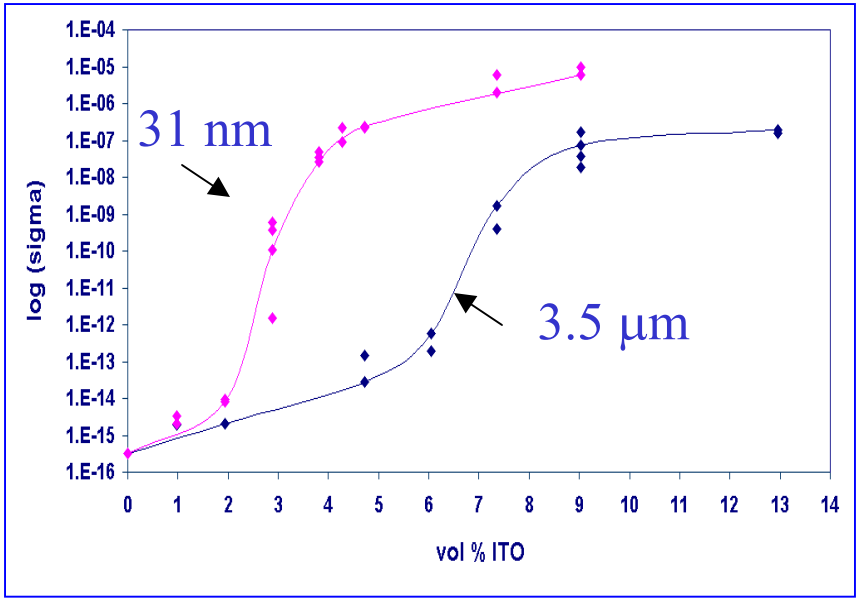
Insulator-conductor composites are used in many electronic and structural applications, from thick film resistors in microelectronic devices to specialized cutting tools. Because of the large difference in the conductivity of one phase and the other, the addition of the more conducting phase to the other causes large increases in the conductivity at a given volume fraction, known as the percolation threshold.

PMMA was used as the matrix filled with varying amounts of indium tin oxide (ITO). The size of the ITO particles provided a nice experiment to show the effect of particle size on the resultant electrical conductivity and other properties such as transparency.



Other composites fabricated and measured included various carbon black/ PMMA, SiC_w/alumina, and many others. Size, shape and distribution of fillers determine the composite properties.

Summer 2003

Undergraduate students learned how to fabricate and characterize polymer matrix composites. Some of them have given or will give talks and/or posters at national conferences (ACeRs, SERMACS, MRS)

During summer 2003, this project benefited from the following summer participants:

***2 high school students*:**
Brittany Matthews, Yolande Lucas

***2 SURF students*:**
Andre Lucas, Charlie Cappozzi

***1 GIFT teacher* : Kimberly Alston**

***2002-2003 REU Participants*:**
Sandy Shackelford, Aparna Trimurty Jue, Jarrett Matthews and Aaron Parker joined graduate students David Maybury and David Mebane and post-doc Runqing Ou