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Electrical conduction mechanism of volume and surface resistivities of multi-walled carbon nanotubes doped polyvinyl alcohol (PVA) and the pyroelectric behavior of polyvinylidene difluoride (PVDF) thin films

Matthew E Edwards

Alabama A&M University, USA

Previously, we have reported measurements of the temperature-dependent surface resistivity of pure and multi-walled carbon nanotubes doped Polyvinyl Alcohol (PVA) thin films. In the temperature range from 22°C to 40°C, with a humidity-controlled environment, we have found the surface resistivity to decrease initially but to rise steadily as the temperature continued to increase. Correspondingly, we have measured the temperature-dependent pyroelectric coefficient of doped PVDF thin films. While the physical mechanism of the pyroelectric phenomenon in PVDF thin films is quite well known, the surface resistivity behavior of PVA thin films is not. Here, we report recent volume resistivity measurements and address the electrical conduction phenomenon that contributes to both surface and volume resistivities of pure and doped PVA thin films. Moreover, we give preliminary detectivity and other relevant quality factors for IR and motion sensors. Regarding the pyroelectric effect of doped PVDF thin films, we give Materials Figures-of-Merit from our measurements. In addition, pyroelectric, surface and volume resistivity infrared detection fundamentals are presented.

Biography

Matthew E Edwards has held the position of Professor of Physics in the Department of Physics, Chemistry and Mathematics at Alabama A&M University, Normal, AL since January 2002, and served as Dean, of the School of Arts and Sciences, from 2007 to 2011, a period of 4.5 years. Previous academic positions held by him prior to 2002 include Associate Professorships at Spelman College, in Atlanta, GA and Fayetteville State University, in Fayetteville, NC, and he was a visiting Associate Professor and adjunct faculty member for 10 years at the University of Pittsburgh, in Pittsburgh, PA. He has more than 45 publications. Also, he has guided five students to advanced degrees: three to the PhD, and two to the Master's degree, and has served on more than 12 other dissertations and theses committees. He was the Guest Editor of the *American Journal of Materials Science* for the 2015 year. Presently, he is guiding two Master's degree students. Also, he sits on the Board of Directors of two journals.

mtthwedwards7@gmail.com

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