OPEN ACCESS Freely available online

Journal of Chemical Engineering & Process Technology

Nanotechnology applications in electromagnetic compatibility

Mohammed Saleh H Al Salameh

Jordan University of science and Technology, Jordan

Abstract

Smart electronic systems, modern wireless communication networks, and remote-controlled systems are sources of electromagnetic pollution. Over and above that, intentional interference such, as the electromagnetic pulse, is unwanted radiation which can disturb and disrupt the operation of the targeted electronic systems. Electromagnetic interference may yield malfunction of electronic devices, data theft, and security threats. Electromagnetic energy is also used as a weapon in the battlefield or as a jamming tool, which can cause malfunction of electronic components on ships, radars, and aircrafts, and may also compromise security of enemies. Thus, military has regulations to ensure that equipment and systems are not susceptible to interference. Industrial countries also have regulations where electromagnetic emissions from every commercial product should comply with specified maximum permissible limits. To avoid the adverse effects of interference and to comply with regulations, electromagnetic compatibility (EMC) techniques come on the scene. EMC measures that significantly reduce interference include shielding, filtering, grounding, circuit and inter-connect layout, transmission line techniques, partitioning, decoupling, and control of signal spectrum. In fact, the application of EMC technology is facilitated through the use of nanomaterial's. With nanotechnology, not only the type, thickness and quantity of material can be chosen, but also the internal structure of the matter can be designed to achieve more efficient functional structures. Nanotechnology is concerned with the design and use of functional structures by manipulating matter at atomic and molecular scale to enhance material properties. To achieve EMC goals of minimized interference and normal operation of equipment not only in the lab but also in the real world, nanoparticles and nanotubes are employed to make new composite materials using nanotechnology with superior performance and higher efficiency as compared with conventional materials. For instance, nanostructured composites for broadband shielding of radio frequency electromagnetic fields and for shielding of low frequency magnetic fields have shown multifunctional properties and higher shielding effectiveness. Nanostructured transparent thin films can shield buildings and vehicles from ultraviolet radiations and heat from sunlight. Nanofoams have the potential to act as shielding elements for space and aviation applications due to their lightweight. Radar radiation absorbing materials designed by nanotechnology have much better performance. Nanowires and nanoribbons interconnects in electronic circuits have lower resistivity and thus can support higher current densities as compared with copper alternatives. Nanoparticles are also important in the natural environment. The present paper tackles the above-mentioned topics.

Biography

Mohammed Saleh H Al Salameh is Full Professor of Electrical Engineering at the Jordan University of Science and Technology, and also is a certified pilot, ppl. He received his PhD degree from the University of Ottawa, Canada, in 1993 in electronic interference. He completed all his degrees (BSc, MSc, and PhD) in Electrical Engineering with honors. He is the author of the book titled "Waves and Fields of Wireless Communications and Electricity: Health-Effects and Unconventional Utilizations,", in addition to other books. He was the dean of scientific research in the American University of Madaba. He was the President of the Graduate Students' Association at the University of Ottawa in Canada during his PhD study.

6th Annual Meet on Nanoscience and Nanotechnology | September 07, 2021

Citation: Mohammed Saleh H Al Salameh, Nanotechnology applications in electromagnetic compatibility, Nanoscience 2021, 6th Annual Meet on Nanoscience and Nanotechnology, September 07, 2021, 02