EDITORIAL

Nanotechnology-based flexible electronics

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Research on flexible electronics has grown exponentially over the last decade. Researchers around the globe are developing a wide range of flexible systems, including displays [1, 2], sensors [3–5], RFID tags [6, 7] and other similar devices [8]. Innovations in materials have been key to the increased research success in this field of research in recent years [9]. Transistors, interconnects, memory cells, passive components and other assorted devices all have challenging material demands for flexible electronics to become a reality. Nanomaterials of various kinds have been found to represent a tremendously powerful tool, with nanoparticles [10], nanotubes, nanowires [3, 11] and engineered organic molecules [12, 13] contributing to the realization of high-performance semiconductors, dielectrics and conductors for flexible electronics applications.

Nanomaterials offer tunability in terms of performance, solution processability and processing temperature requirements, which makes them very attractive as building blocks for flexible electronic systems. Indeed, such systems represent some of the largest families of commercially produced nanomaterials today, and numerous commercial products based on nanoparticle formulations are widely available.

This special issue focuses on the rapidly blossoming field of flexible electronics, with a particular focus on the use of nanotechnology to facilitate flexible electronic materials, processes, devices and systems. Contributions to the issue describe the development of nanomaterials—including nanoparticles, nanotubes, nanowires and carbon-based thin films—for use in conductors, transparent electrodes, semiconductors and dielectrics. The articles feature innovations in nanomanufacturing and novel materials, as well as the application of these technologies to advanced flexible devices and systems.

As flexible electronics systems move rapidly towards successful commercial deployment, it is extremely likely that they will exploit nanomaterials as building blocks. Developments in the field will help to leverage the power of these materials to realize novel functionalities in flexible form factors. This special issue provides a view of the state of the art in these technologies, and gives a vision of the coming innovations that will make flexible electronics a reality.

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