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Development a superhydrophobic and photocatalytic textile fabric by pulsed magnetron sputtering

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Nowadays, textile materials have been widely researched in order to be used in various technological areas. Interdisciplinarity becomes a key factor in order to combine different properties to obtain a multifunctional material. Thus, in this work it is possible to find the mix between the physics and chemistry, amongst the macro, micro and nano. This work presents the results of the application and characterization of nanocoating by physical vapor deposition with pulsed magnetron sputtering (PVD-PMS) and other materials with hydrophobic and photocatalytic behavior. The treated and untreated materials were characterized by several techniques, namely: static and dynamic contact angle, X-ray photoelectron spectroscopy (XPS), Fourier transform infrared spectroscopy (FTIR), scanning electronic microscopy (SEM), transmission electron microscopy TEM, X-ray diffraction (XRD), and atomic force microscopy (AFM). Results support the achievement of a PLA fiber multifunctional with excellent photocatalytic properties (Methylene blue degradation), self cleaning, antibacterial and superhydrophobic. With the optimization of experimental parameters on the PLA fiber using a statistical planning with a response surface methodology was obtained as an efficient plasma treatment process on PLA fibers in order to improve their work of adhesion. In addition, we obtained using the same methodology PLA fibers superhydrophobic and photocatalytic nanocoated with Ag doped TiO2 by PVD pulsed magnetron sputtering (PMS). A contact angle of 170° was obtained using the following parameters: argon flow/oxygen (reactive gas), low-power, time (minutes) and a reverse phase. Besides these, above properties was also developed with PLA fibers, and superhydrophobic/photocatalytic properties.

Biography

Jose Heriberto O. Nascimento has graduated in Textile Engineering from University of Federal of Rio Grande of Norte in 2004. He is a Ph.D. in Textile Engineering from University of Minho, in Portugal. Currently, he is an associate Professor at the Textile Engineering Department, in University of Federal of Rio Grande of Norte. His research is focused in nanotechnology applied on textile and polymer materials, development of the drug delivery polymeric systems and micro/nanoemulsion systems. He has published papers in reputed journals and conferences in nanotechnology.

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Ripple carry adder using two XOR gates in QCA

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Quantum-dot cellular automata (QCA) is a very recent, emerging technology which can be used for developing new type of digital circuits having ultra-low power consumption and circuits which are made using this technology are extremely small and it is also known that various circuits in present CMOS-based technology are reaching the limit in terms of space consumption. A quantum-dot cellular automata cell consists of four quantum dots in a square array coupled with tunnel junctions. The logic value ("0" and "1") are stored as orientation/position of electron in quantum dots inside QCA cells rather than voltage levels in CMOS. These all factors made this technology as one of the best substitutes for CMOS technology.

QCA is a newer technology so it has to develop from design level to devise level. This paper mainly aims at reducing the number of cells, area and delay of a full adder's traditional design. My design uses two XOR gates to make a full adder with 124 cells, 1.5 clock cycles delay and .12 micrometres square. Ripple carry adder is made by cascading 'n' 1 bit adders, made as above in series.

Biography

Kandula Suresh, studying 3rd year electrical engineering in IIT Kanpur, mentored by Dr. Bahniman Ghosh, post-doctoral fellow, Department of Electrical and Computer Engineering, University of Texas at Austin, USA, worked as TCAD and device engineer in the non-volatile memory group in Free Scale Semiconductor (Motorola), Inc., Austin, Texas, USA, and presently working as assistant Professor in electrical engineering department of IIT Kanpur.

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