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Design of Micro Domain Composites Structure for Advance Optical Application

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Abstract

The experimental work focus on the electronics based on micron level devices. A lot of research work has been done on micron level electronics application, but the main untouched thing is the sandwiched concept of micro level fabrication with optics. We have been inclined towards green chemical and mathematical approach due to sustainability of research work. There is a tremendous opportunity and growth in the connection of micro devices used for optical applications such as use of CdSe (Cadmium Selenide), CdS (Cadmium Sulfide), AuNPs (Gold Nano Particles), AgNPs (Silver Nano Particles) etc. Experimental results may be compared with simulated results, from Virtual Nano Lab (VNL) etc in future work. This may also be follow up by optimizations.

Keywords: Micro Devices, Optical Devices

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1. Introduction

Most of the coal has been already use by society and industrial groups. Maximum fuels are switched toward the renewable energy giving instruments. As around 0.8 million years ago, oldest renewable energy was came into existence. The source of this was bio degraded fossils. [1-3]. A renewable energy is a kind of energy source, which consists of reusability of used materials/items. Light from sun, flow from air, flow from water, energy generated from rain and tides/waves followed by heat and other geothermal heating are main examples [4-7]. There is less value of losses in such kind of format. Dual-fed induction generator wind turbine was used in a long way back, due to use as a source for energy generation. Electrical machines are well suited for various domains [8-9]. The substantial growth of fermented enzymes is shown in fig. 1-2-3.



Fig. 1: Test result of Oxidations, Fig. 2: at higher concentration, Fig. 3: at large time interval, growth of enzymes

Electrical machines also summarized in various parallel domains are single phase, three phase, and AC and DC generators. Wound and Squirrel cages are few of them. Asynchronous, synchronous, KWH, hybrid machines are the next one [10] in this follow up. With the use of electronics and electrical domain knowledge, energy harvesting terms got its value in the area of energy. Energy lost may be saved in this domain.

Micro electronics in Renewable energy consists of designing of instruments at micron level. It gain popularity due to maximum turbulence got vanished. In continuation, laminar flow and stream line flow are main things remaining in it. In micro devices, certain boundary conditions are applicable. [11-13]. AC and DC micro grids i.e. DC and MG automations is being used under this category. By using PDMS, chemically, we have created micron level channel. In this method glass substrate we have used, followed by chemical analysis, CAD design, Etching and fabrication was being done in lab. Fig. 4-5-6 shows various architecture at various domains.

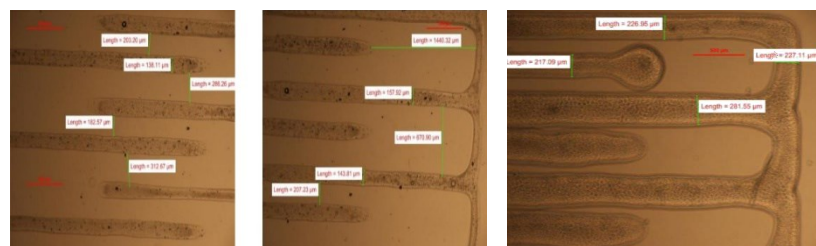


Fig. 3-4-5: Microscopic view of fabricated PDMS channel on glass at varying zoom

Fig 6, 7 shows spin coated gold electrode on glass substrate and nano particles suspension by using electrical methods and chemically en route methods respectively. It is a solution of various polymers at difference weight percentage. Their rheological properties are also well defined by using viscometer (Brookhaven) and rheometer (Anton Inc) [14-15].

In the area of Ultra-and Very-Large Scale Integration field growth, there is a significance of nano integration also. At this level, surface to volume ratio reached at much high value. So the electrical, mechanical, structural and morphological properties are changed tremendously [16-18]. In the fig 4, 5, there are the electronic shapes on nano level. Barium Titanate and Titania with various polymers are used at varying weight percentage. Nano power generators may consists of nano pores by using already well explained concept. [19]. Carbon nano tubes also used for energy devices as when coated and/or dispersed on ITO, glass, Mica and other substrate. Fig 8 shows CNT on glass substrate.

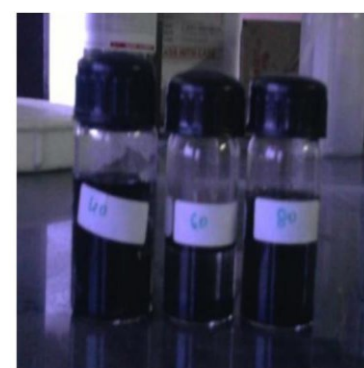


Fig 6: spin coated gold electrode on glass substrate Fig.7: nano particle suspension at varying conc.

It will be benefited from its low cost, flexible scaling, shapes. Ferric oxide also is being used in this follow up in recent research. Their microscopic properties are also well defined by using scanning electron microscopy (SEM) (Brookhaven) and Transmission electron microscopy (TEM) [20-21].

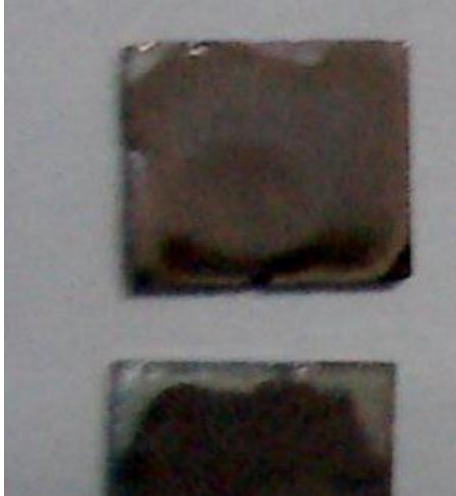


Fig 8: Suspended single walled carbon nano tubes on Glass substrate

2 Results and discussion

Electron microscopic images are recorder and they are used for comparative studies with the existing conventional energy devices. Metal oxide with their compound such as CdSe, CdS, ZnS, ZnSe, TiO₂, BaTiO₃, Fe₂O₃ and Al₂O₃ are best one in energy harvesting for save earth and this globe. This also cut C/CO₂-emission in numerous ways. Challenges are control at micron and nano levels. Atomic force microscopy of suspended carbon materials, Fourier transform infrared spectroscopy image, collagen fibers, transmission electron microscopic images and XRD are taken by their respective imaging and medical tools. So in this manner an interrogative method was done biomedical applications. Figs. 9 to 15 are their respective characterizations and graphs.

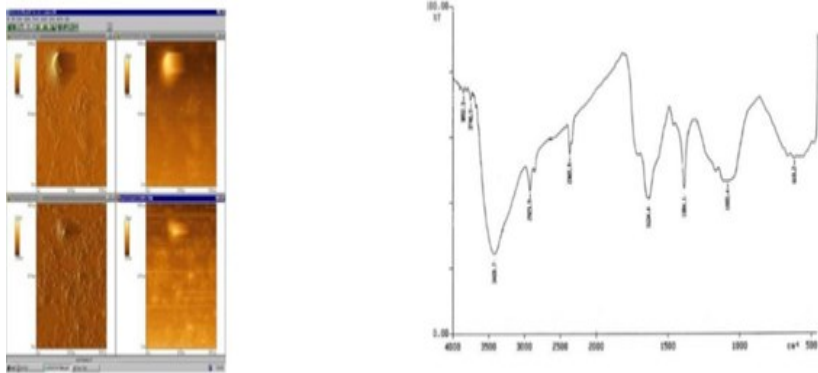


Fig 9: AFM image at various resolution Fig 10 : FTIR for confirmation of attached molecules

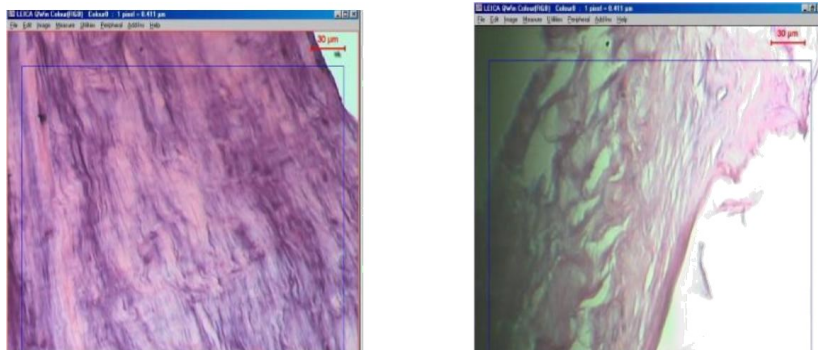


Fig 11: Microscopy image of collagen fibers/tissue Fig 12: Microscopy image of collagen fibers/tissue (various RoI)

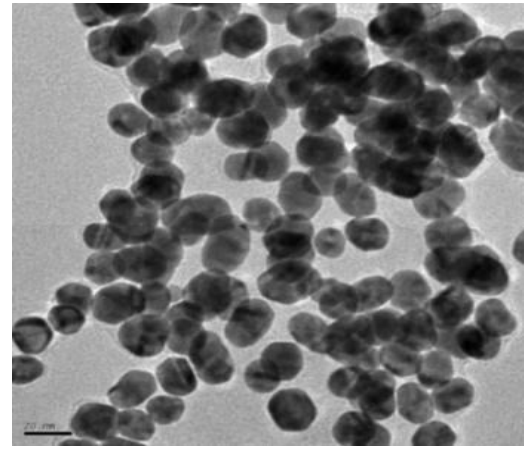


Fig 13: TEM of nano particles (CdSe/CdS)

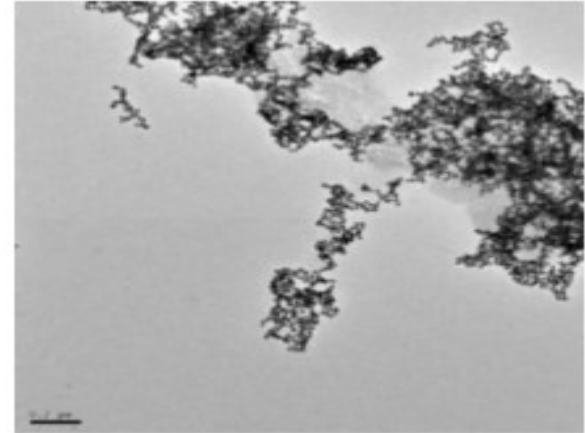


Fig 14: TEM of nano particles (CdSe/CdS)(various resolution)

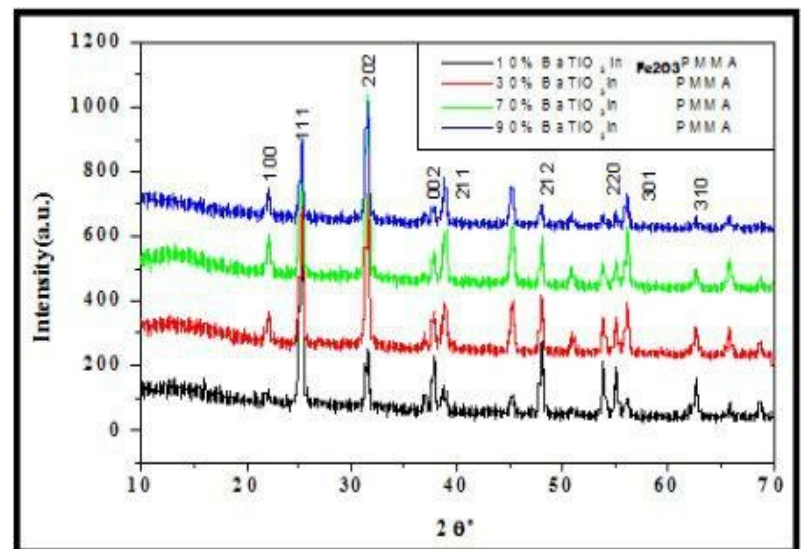


Fig 15: XRD images for combined wt% (metal oxides/polymers)

4 Conclusion

By the application of nano and micro materials, there is appreciable implementation in energy booster. Also with the help of nano material and their control and optimized flow through Microfluidics channel hence beneficial for medical applications. Also quantum computing and data-information safety and security can be enhances by using such types allied application of Science, Technology, Engineering and Medical/Mathematics (STEM). Various algorithms (Nature Based Algorithm and Allied Algorithm etc) may be used for optimizing the primary, secondary and extraneous variables throughout the experimental and theoretical processes. This will confidently enhance the all benefit for mankind and environment under the aegis of renewable and sustainable energy in 21th century and in near future. Still some bottle neck in this emerging research areas are as follows: solar and wind energy is sometimes criticized for being variable entities & parasitic effects to optimize.

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