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Impact of Pico Technology in Bandgap Engineering

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Abstract: ***The automotive industry's use of lubricants is another area where pico technology has applications. Rudenko outlined the application of nano materials for reducing atomic-scale wear and tear. Engine wear and tear have been greatly reduced by using graphene, one of the most promising materials in a variety of industries, as a lubricant. Because of its structure at the nanoscale, graphene has made significant strides in reducing friction. The synthesis of materials with distinct properties might be possible through atomic-scale manipulation. One side of a lubricant, for instance, might be chemically active, while the other might be inert. As a result, there would be less friction on both sides and one side would be able to adhere to materials with ease.***

Keywords: ***Pico Technology, Band Gap Engineering, Lubricants and Graphene.***

1. INTRODUCTION

For applications using visible light, cerium oxide (CeO2) nanostructures must have a smaller optical band gap. The visible light photocatalytic activity of pure CeO2 nanostructures (p-CeO2) is reported to be improved utilizing an environmentally friendly method that uses an electrochemically active biofilm (EAB) to decrease the band gap caused by defects. The defect-induced band gap narrowing of the CeO2 nanostructure (m-CeO2) was confirmed by X-ray diffraction, UV-visible diffuse reflectance/ absorption spectroscopy, X-ray photoelectron spectroscopy, electron paramagnetic resonance spectroscopy, Raman spectroscopy, photoluminescence spectroscopy, and high resolution transmission electron microscopy. The existence of structural flaws brought on by the decrease of Ce4+ to Ce3+ as well as an increase in the amount of oxygen vacancies was also shown by the structural, optical, photo catalytic, and photo electro chemical characteristics. When exposed to visible light, the CeO2 (m-CeO2) nanostructure showed significantly increased photo activity**.**
The capacity to affect the physical characteristics of a system through its dimensionality is an intriguing phenomena that distinguishes semiconductors in the nanoscale regime, as was established for a vast range of systems including 2D quantum wells, 1D nanowires, and 0D

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quantum dots. A fascinating example of a system where the physical properties are both strongly influenced by the 1D nature of the entire particle as well as the effects of the dimensionality, dimensions, and composition of each component on its own is heterostructured nanorods, which are made up of two or more semiconductors.

The increasing development in the colloidal synthesis of nanocrystals now makes it possible to create a wide range of heterostructured nanorods with various compositions and architectures, from seeded nanorods to rods with asymmetric spatial compositions.

2. METHODOLOGY

The solution liquid solid (SLS) process was first used to demonstrate the formation of elongated semiconductor nanowires and nanorods utilizing colloidal chemistry. This method uses a liquid metallic cluster as a catalyst to dissolve the reactants, and the wire then develops straight from the supersaturated drop [7], [8], [9].
This method's metallic drop near the edge of the semiconductor wire impacts the optical characteristics.

3. RESULTS & DISCUSSION

Sr. No	Time (PS)	Energy (KCAL/Mole)
1	0.005	38575.02
2	0.01	38573.36
3	0.015	38567.24
4	0.02	38555.89
5	0.025	38541.19

Sr.No	Time (PS)	Energy (KCAL/Mole)
1	0.03	38523.46
2	0.035	38496.32
3	0.04	38445.90
4	0.045	38356.70
5	0.05	38221.92

Sr.No	Time (PS)	Energy (KCAL/Mole)
1	0.055	38051.96
2	0.06	37871.85
3	0.065	37706.35
4	0.07	37566.01
5	0.075	37448.22

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The capacity to affect the physical characteristics of a system through its dimensionality is an intriguing phenomena that distinguishes semiconductors in the nanoscale regime, as was established for a vast range of systems including 2D quantum wells, 1D nanowires, and 0D quantum dots. A fascinating example of a system where the physical properties are both strongly influenced by the 1D nature of the entire particle as well as the effects of the dimensionality, dimensions, and composition of each component on its own is hetero structured nano rods, which are made up of two or more semiconductors.

As ancient as semiconductor physics is the idea of electronic structure engineering. It was quickly realized that appropriate solid combinations of these materials might be utilized to change the size of the forbidden gap with the discovery of binary compound semiconductors like GaP and GaAs. A novel technology of quaternary alloys including elements of Ga, In, P, as, and other elements produced on premium InP substrates was created as a result of such investigation, which was particularly strongly sparked by the development of the optical cable (see, for instance, Pearsall, 1982). It is now feasible to grow high quality epitaxial layers of technologically significant semiconductors in virtually arbitrary (and carefully regulated) thicknesses at the same time as the creation of novel alloys. The band is in an alloy.

4. CONCLUSION

The increasing development in the colloidal synthesis of nanocrystals now makes it possible to create wide range of heterostructured nanorods with various compositions and architectures, from seeded nanorods to rods with asymmetric spatial compositions. The technological use of III-nitride alloys makes an accurate forecast of their optical characteristics very appealing. The zincblende Ga1-xInxN's structural features and band-energy properties are investigated using numerical simulation based on first-principles calculations. This study's goal is to theoretically investigate, using the KKR-CPA technique, the electrical and optical properties of the parent InN and GaN compounds and their ternary alloys. We demonstrate the effectiveness of density functional theory as a tool for: 1- investigating the local effects of doping, 2- examining the impacts of defects, 3- examining the effects of size and disorder on the optical and electrical properties of these materials, and 4- forecasting the characteristics of future materials.

Sr.No	Time (PS)	Energy (KCAL/Mole)
1	0.08	37350.78
2	0.085	37284.85
3	0.09	37271.43
4	0.095	37318.03
5	0.1	37405.19

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Sr.No	Time (PS)	Energy (KCAL/Mole)
1	0.10	37504.44
2	0.11	37600.41
3	0.115	37692.21
4	0.12	37884.26
5	0.125	37878.86

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