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Nano-Optics is a Valuable New Category of Technology

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INTRODUCTION

The study of light's behaviour at the nanometer scale and the interaction of nanometer-scale objects with light are known as Nano photonics or Nano optics. It is a subfield of electrical engineering, optical engineering, nanotechnology, and optics. It frequently involves metallic components or dielectric structures like nano antennas that can transport and focus light using surface Plasmon polarities. Utilizing light's unique interaction with subwavelength, nanoscale patterned materials and nanotechnology-enabled fabrication methods to create a broadly applicable optical device and manufacturing platform, nano-optics is a valuable new category of technology. The foundation of nano-optic components is a periodic pattern of nanoscale structures on an optical substrate with critical dimensions much smaller than the wavelength of light passing through them.

DESCRIPTION

Nanostructures in 1, 2 or 3 dimensions can also be used to create nano-optics. Additionally, it is possible to design nano-optic devices to function over any wavelength range. With the appropriate modifications to the structural dimensions and materials, the fundamental approach can be used with UV, visible, and infrared wavelengths. Numerous manufacturing techniques are available for the creation of nano-optic structures. An optical device is not optimally practical for commercial use unless it can be manufactured in large quantities, available in a variety of application-specific variations, and easily integrated with other relevant technologies. The controlled and on-demand release of anti-cancer therapeutics like adriamycin from nanoporous optical antennas, which are used to target triple-negative breast cancer and mitigate exocytosis anti-cancer drug resistance mechanisms, has also been linked to nano photonics. This allows the therapeutics to avoid toxicity to normal systemic tissues and cells. By appropriately patterning material on the nanoscale with structures whose critical dimensions are sized to be several times less than the wavelength of light at which they operate, optical materials with highly useful modified optical functions are created, resulting in the unique optical properties of nano-optic devices. Additionally, manufacturing hybrid integrated optical components can benefit from nano-optic components. Many of these devices have a wide acceptance angle, making alignment easier and saving money and time. In addition, nano-optic devices are tolerant of a wide range of manufacturing processes due to their robustness, which allows them to withstand temperatures ranging from –200˚C to 400˚C with the right choice of materials. Nanomaterials in optical components can be found in everything from complete devices whose operation is dependent on their optical properties to components that are utilized in non-optical devices and optical coatings that are utilized to both enhance and protect the device's optical properties.

CONCLUSION

Nano-optics utilizes a growing "design vocabulary" that is functionally equivalent to semiconductor design libraries. For particularly sophisticated nano patterns and multi-layer devices, complex, multi-step, and multi-process methods can be combined with multiple design elements. The goal of nano-optics, also known as nano photonics, is to comprehend and control the interaction between light and matter on the nano meter scale. Under the intense collision of atoms and electrons in nanostructures, nano optical technology can produce the plasmonic effect, which is a type of new optical technology. It has significant effects in near-field optics, high-density data storage, super resolution nanolithography, and other fields. Nano photonics encompasses a wide range of nontrivial physical effects, such as interactions between light and matter that go well beyond the limits of diffraction. These interactions have opened up new applications in light harvesting, sensing, luminescence, optical switching, and technologies for transmitting media.

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