

REVIEW ARTICLE

DIELECTRIC OPTICAL ANTENNA: A NEW CONCEPT FOR MICROWAVE FREQUENCIES

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ARTICLE DETAILS

Article History:

Received 15 October 2020
Accepted 18 November 2020
Available online 07 December 2020

ABSTRACT

The dielectric optical antenna operating band is used to enhance bandwidth of operation band. The dielectric resonator antenna has high permittivity. The capabilities of antenna depend on made-up materials. Antenna range plays very important role for transmission of radio-signals. The properties of antenna play very important role in any technical or communicational devices. Current communication system requires high level portable communicational devices. Nanoantenna has high level configurable conductor power to help to change specific feature. Optical antenna has great capability to connect one network another network. The specific feature of optical antenna moving around development of our life to give convenient life. Only advanced generation technology has power to change our simple life to advanced technological life. In this research paper we have introduced new technical idea to develop our brain to gain high level efficiency to controlled our system with helps of antenna full usability for human being. The antenna characteristics depends on permittivity, dimension, properties limiting factors, geometrical properties, shape, model, wavelength scale and intensity of antenna aperture wavelength, which incident radiation relates to its design. In this paper we apply maxwell equations for free space propagation, as well as solve its amplitude of phase future plasmonic integrated circuits will be capable to extremely high range data processing at optical domain, the optical frequencies will be controlled by efficient optical emission of plasmonic antenna. In this project the new concept of microwave range arrays is applied to convert plasmonic optical antenna array, with nano-coupled plasmonic wave guide, as a spatial filter to absorb a specific wave length at particular specified incident angle. Nanoantenna transmits optical signals on nanometre scale. Optical nanoantenna are expected to radiate in THZ or GHZ frequency range. Optical DRA antenna has very unique and key application for such types of device based configuration. The optical DRA -antenna has unique spectral ability to optimize as well as design in nanometre scale.

KEYWORDS

Optical communication, Nanoantenna, GHZ frequency, Radar system, bandwidth, Antenna scale.

1. INTRODUCTION

We study dielectric metallic nanoparticles which operate two frequencies and highly directive emission are realized simultaneously achieve optical Antenna scale optical communication has great advantage for sub wavelength enhancement (Mohan, 2015; Mohan, 2014). The key advantage of quantum communication is intrinsically low efficiency and reduced size of active medium at nanoscale. The nanostructure plasmonic subwave length has resonator for enhancing nonlinear tenability and their structural coupling morphology has confine electromagnetic diffraction limit according to field (Mohan, 2016; Mohan, 2016). The frequency conversion for plasmonic resonances must be spatially match mode (Mohan, 2016; Singh et al., 2016). The distribution of electric field or coherent radiation has harmonic photons for far field or far field ration

(Akyildiz et al., 2014; Mohan, 2017). The Gold nanoparticle antenna or gold nano antenna has distribution of electric field has to be tailored way in this way the generated near field nonlinear coherent radiation harmonic (Nagatsuma et al., 2016; Mohan and Kumar, 2016). Antenna demonstration plays an important role and properties of double resonance and designing and x-y plane intensity scattered quantities of metals in dielectric order general described the optical antenna and their properties for localized from plasmons which can introduce potential applications and directly related to max well and relationships between material is $D(\Gamma) = \epsilon(\Gamma) E(\Gamma)$, $B = \mu H$ and $J = \sigma E$ where D is the electric displacement J is the current density and B is the magnetic induction

$$\nabla \cdot H = 0 \quad (1)$$

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10.26480/imcs.02.2020.27.29

$$\nabla \cdot E = \frac{\rho}{\epsilon} \quad (2)$$

$$\nabla \times E + \mu \frac{\partial H}{\partial t} = 0 \quad (3)$$

$$\nabla \times H + \epsilon \frac{\partial E}{\partial t} = \sigma E \quad (4)$$

This equation gives information about material and its properties.

Dielectric material can be described with harmonic oscillate at zero change and metal creating transverse electromagnetic frequency wave (Mohan, 2015; Mohan, 2019a). The dielectric constant of high energy transition and reflective frequency for intra-band mode, the optical Antenna are based on surface plasmon and interaction of particles has good boundaries condition, and their diameter is d , the electromagnetic field can be analysed by quasi approximation, and Laplace equation of potential, $\nabla^2 \phi = 0$, The boundary condition of the component is normal and approach is rigorous, the design of Antenna generally localized energy and vice versa. The light particles interaction of nano scale resonances (Mohan, 2018a; Mohan, 2018b). The counter parts of radio wave and microwave regimes. The xantenna system consists circuit and elements which is familiar for capacitors, resistors and inductors (Mohan, 2019a; Mohan, 2019c). The RF circuit idea for optical regime making possible that nanoparticles can be used for optical manipulation and absorption enhancement applications (Mohan, 2019d; Mohan, 2019e). Generally optical Antenna transfer electromagnetic wave for free localize propagation. Present days Antenna play like technological weapon can controlled any communication Radar system. Optical antenna has high bandwidth enhancement to control as well as improved its directivity and properties. Antenna intensity effect on wavelength, radiation amplification. The resonator of Antenna may be used for the radiator resonator to analysis and observed from the side of the bottom. Optical antenna plays key role for energy harvesting and solar cell or every. Every technology has certain limitations to develop and establishment as well as fabrication of the system. Now days optical devices play big role to making devices at nano or micro level, so we can say that coming era is nano era. Near future will be full bright with their classical analogs. The antenna is simple called Aerial but their area hole-wave covered. Several applications have allowed us to enable at near field or far field transmitting resolution for biological or Bio -sensing devices. optical antenna has unique ability to create new direction of technology for future development and total clear technological backwardness to society. Optical antenna has many unique uncertainties with unique properties to promote as well as develop their approaches and function. The dielectric antenna generate radio-frequency at nano-level. Element or properties of element play an important role to fabrication as well as manipulation of antenna. The fabrication process may be defined or described to explore designing parameters to design and increase spontaneous emission rate with improved magnitude level. The dielectric material has effective medium concept with quasi-static approach for the theory wave propagation, the permittivity of an optical antenna proves its suitable element array application. The Gold nanoparticles has great advantage for optical communication system and antenna network designing. The dielectric optical antenna has superior conductor which generate high level enhancement to improve its potential performance with high impedance value. The antenna structure plays an important role to control and nano optical system. Optical antenna making material is engineered nano material or gold material which provides high and advance level technology to fabricate and simulate high and advance conducting antenna. The fabrication way may be described as present wavelength propagation of antenna dielectric material and also determine its far field radiation increasing pattern to increase antenna gain with low losses of efficiency. Surface of dielectric material model uses effective medium based concept on quasi-static wave approach and theory of antenna depend on formula of polarization techniques for approximation model to utilized related material. The dielectric material uses for the effective medium concept with quasi-static approach. The formula model techniques play important concept to solved proposed theoretical or simulation model. The GHz, THz frequency has high levels coupling element or Au/Ag element. The requirement and consideration for design many level systems for antenna designing technique as well as attract to use commonly by cellular market.

2. SIMULATION RESULTS OF OPTICAL ANTENNA

In order to validate the simulation selected parameters, initially to conventional antenna has been considered. The antenna mainly consists of two elements of equal length L , and height H is separated by distance G .

In the analysis evolution we take gold-dipole, which length approx $L=250$ nm, $W=45$

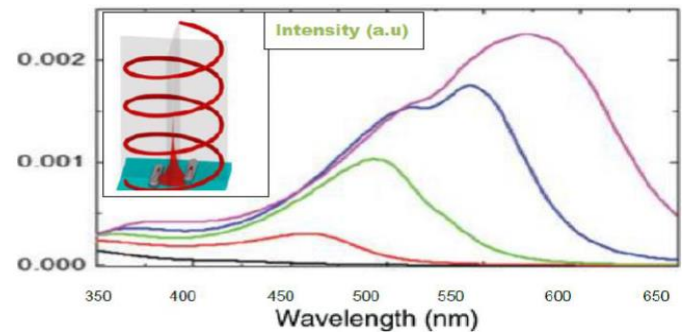


Figure 1: Intensity of Optical nanoantenna

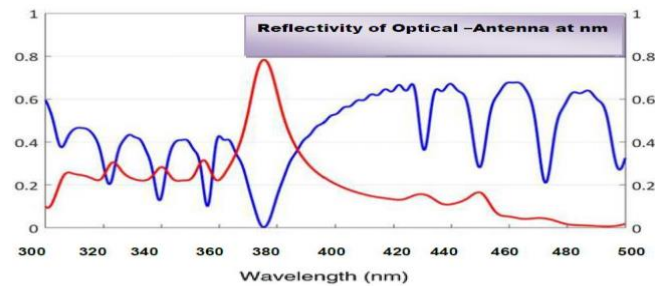


Figure 2: Reflectivity of optical antenna at nm scale

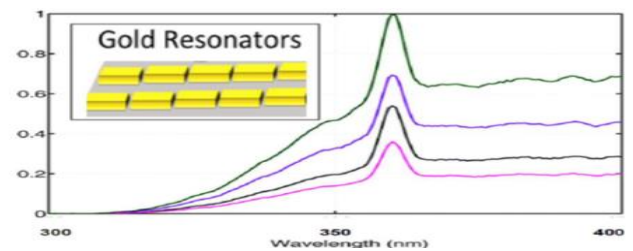


Figure 3: Gold Resonators of Optical antenna

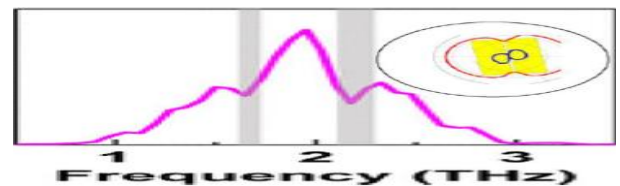


Figure 4: Antenna frequency at THz scale

3. CONCLUSION

In this research article we presented the new or novel approaches of optical antenna which is excited from the nano-plasmonic. Several models of antenna used for many purpose of optical communication which has unique ability to control and achieve smartly to improve its communication range. The total system depends upon various fixed parameters and architecture of designing of antenna models only optical antenna has high permittivity with low reduction, optical DRA antenna allowing us to achieve our parameters model with high efficiency antenna is also capable to supply humanity energy for almost another 1 billion years Plasmon is an immerging branch of nanophotonic and very rapidly growing part of optical communication in this branch we studied about light - metal interaction. Now a days optical antenna has many area application for surface such as enhanced Raman scattering, detection, early age detection, emission, molecule detection, spectroscopy, high density optical data storage, optical circuits, and many others applications. Currently, there are many types of communicational devices used to improve their efficiency. In this research paper we have studied all about optical antenna for devices level communication system in this research paper we have also improved and proposed their operation area and performance of DRA antenna can easily manipulate and fabricate for long distance with much lower cost than in past. In this research paper we have mainly focused on the theoretical as well as simulation aspects of optical DRA antenna with single element and arrays with general methodology of

optical DRA antenna designs. We have analyzed as well as designed optical DRA antenna by dynamically tuning coupling method which is highly tunable and strong field enhancement confinement distribution resonance frequency bandwidth radiation pattern for design new electrical tunable optical antenna.

ACKNOWLEDGMENT

This Research Paper is an outcome of a fellowship sponsored by the Department of Science and Technology (DST), Govt. of India.

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