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## Environmental impacts of land use and land cover changes in Solan District of Himachal Pradesh

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### ARTICLE INFO

**Key words.** Burgeoning, Diversity, Land use, Spatio-temporal, Undermine.

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### ABSTRACT

The way in which a part of landscape serves a functional purpose is defined as land use. The natural features on the surface undergo continuous change and these changes may be as old as the human history is. But the rate or scale of this change has become much faster in the recent past which is resulting into various environmental problems. Land use/land cover is an issue of global importance as the world's about eight billion people compete for food, water and shelter. India is the seventh largest and second most populous country in the world with amazing physical and cultural diversity. The massive conversion of valuable and limited land resource to agriculture, construction and other land uses are undermining the capacity of this resource to sustain a burgeoning human population. Knowledge about existing land use/land cover and trends of change is essential for the proper planning, management and regulations of the use of such resources. In the present study effort has been made to analyse the environmental impacts of this spatiotemporal changes in land use/land cover in Solan district of Himachal Pradesh.

### Introduction

The land is a fragile eco-system which supports all living thing of the earth. Increasing human and cattle population demand for more space for its existence. Above all the restless nature of human beings continues to stride for achieving more and more development without caring environment. The land use/land cover has been changing at national, state and district level due to rapid urbanization, industrialization, transportation and many other developmental activities. This has been resulting into increase in the amount of green house gases, degradation and deterioration of soil and

various kinds of pollutions. The air, water and noise pollution have reached to alarming level due to changing taking place in land use/land cover (Shukla et al., 1992). The quality of the environment has also deteriorated due to the contamination of air and water as a result of excessive use of insecticides and pesticides. Raina, (1997) has rightly remarked that in last few years the climatic season are not getting their proper time. This may be attributed to the deforestation as well as other land use and land cover changes. The congestion and noise pollution is yet another environmental problem of modern time which are coming into fore as a result of increase in built up category. The Solan district in general and its urban centre in particular is becoming the first

## Review

# Magnesium ferrites and their composites based photocatalysts: Synthesis approaches, effect of doping, and operational parameters on photocatalytic performance for wastewater remediation

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## Abstract

In recent years, increased discharge of toxic effluents into water bodies has severely harmed ecosystems and human well-being. Various techniques are employed to remove contaminants, among which photocatalysis have proven to be the most environment friendly and effective technique. This review focuses on  $MgFe_2O_4$ , an exceptional photocatalyst owing to their small band gap, spherical shape, magnetic responsiveness, stability, reusability, cost-effectiveness and small crystallite size. We have covered comprehensive comparison of research studies from the past decade to assess Magnesium ferrite's photocatalytic potential in pure, doped, and composite forms. Along with synthesis methods, degradation mechanisms, and shortcomings explained in detail. Furthermore, we have highlighted the enhanced photocatalytic capability of doped  $MgFe_2O_4$  and their nanocomposites towards the various organic contaminants upon visible light irradiation under a comparatively short period of time. Factors like cation distribution, dosage, pH, as well as methods for recovery and reuse are discussed to aid in production of more efficient photocatalysts. There has been a lack of information on the techniques that can be used to overcome the various shortcomings of  $MgFe_2O_4$  ferrite. Hence, we have accentuated on bringing forth such advanced techniques that would aid in driving the researchers' attention towards the practical and industrial application of the hybrid  $MgFe_2O_4$  nanoparticles. Lastly, the research gaps and industrial need of  $MgFe_2O_4$  ferrite-based materials were addressed to offer a concise view.

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**Keywords:**  $MgFe_2O_4$ ; ferrite; Composites; Photodegradation; Wastewater remediation; Pollutants.

**Abbreviations:** SENP, Spinel ferrite nanoparticles; MFNP, Magnesium ferrite nanoparticles; MFNC, Magnesium ferrite nanocomposites; GCMS, Gas chromatography-mass spectrometry; FE-SEM, Field emission – Scanning electron spectroscopy; SQUID, Superconducting quantum interference device; TEM, Transmission electron microscopy; SEM, Scanning electron microscopy; EDX, Energy dispersive x-ray; M-H loop, Magnetic hysteresis

loop;  $M_s$ , Saturation magnetisation;  $M_r$ , Remanent magnetisation;  $H_c$ , Coercivity

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## Perception of over tourism: A study of Shimla town

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### Abstract

The effect of electronic word-of-mouth (eWoM) has significantly transformed e-marketing, particularly in the tourism and hospitality sectors. The rise of social media and digital platforms has made them the most prominent sources of information. Online traveler-generated content, such as travel blogs and Online Travel Reviews (OTRs), offers valuable insights into travelers' experiences, opinions, interests, and changing travel patterns, as well as information about both mainstream and offbeat attractions. This content, created by users, provides a large volume of reviews that assist other travelers in making decisions during the pre-travel phase. It also helps in identifying and measuring visitors' perceptions, satisfaction levels, and evolving travel trends. This research paper focuses on the experiences of tourists visiting Kufri, a popular tourist spot of Shimla, Himachal Pradesh, between August 2019 and 2024. The study examines a sample of English-language OTRs from Trip Advisor, specifically investigating the interactions between tourists and local stakeholders. Shimla, known for its colonial architecture, cool climate, and scenic landscapes, is facing the challenge of over tourism. Various studies have applied models such as Doxey's Irridex and Butler's Tourist Life Cycle to explore the stages of residents' reactions and the evolution of a tourist destination due to tourism development – from growth to decline. By analyzing tourists' interactions with host community, this study provides a comprehensive overview of the challenges posed by over tourism. It also offers insights into destination management and preparations needed for future tourism, aiming to enhance the sustainability and effectiveness of tourism in Shimla.

**Keywords:** Tourists, experiences, online travel reviews, host community, impacts, over tourism

### Introduction

Shimla, the capital of the Himalayan state of Himachal Pradesh in Northern India, is located at 2397.59 meters above sea level in latitude 30° 6' N and longitude 77° 11' E. The climate, surroundings, and geographic location of this well-known hill city are all well-known. As British India's summer capital in the first half of the 1800s, Shimla rose to prominence. Because of its climate, which is similar to that of England, the British used to come here in the summer to escape the intense heat of the Indian plains. With the growth and development of its infrastructure, Shimla went from being a town to a city throughout time. Nonetheless, its colonial character has been preserved, as evidenced by its historic structures, well-educated locals, and year-round good weather. As they say, "Shimla is an Indian town that looks and feels like a village in Northern England, and it's a state capital at that" (Khan, 2014). The city is a well-liked vacation spot that is visited all year round for a number of reasons. It is seen as the worst example of Victorian-modern design because it does not represent either Indian or British traditions, or it has combined both. Within or across state borders, it has been predominantly inhabited by people of many communities and beliefs. Most city dwellers are either private business owners or employees of the state or central government. It attracts a wide variety of tourists, particularly in the summer. Many problems arise for tourists during the this time of the year, including the lack of accommodations due to the high number of tourists during some seasons, the lack of new tourist attractions, the dirty and awkward public areas, the incapacity to control taxi drivers and porters who try to con tourists, and the scarcity of tour guides in the town (Pabby, 1996). These issues are all clear manifestations of over tourism. The *Cambridge Dictionary* defines "over tourism" as a situation when huge masses visit a place to utilize their free time that results in ruining the local environment, making it difficult for the inhabitants to stay there, whereas *Collins Dictionary* describes it as a phenomenon in which tourists overrun famous tourist destinations, that too, in an unsustainable manner.

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## Negotiated peace in Africa: a case study on the Pretoria Peace Deal between Federal Democratic Republic of Ethiopia and Tigray Peoples Liberation Front

Daniel Gidey Derbew, Kunwar Siddharth Dadhwal & Sandip Kumar Singh

### ABSTRACT

There are many different methods to put an end to a battle, but traditionally, the majority have been settled either by victor's peace or diplomacy. Concessions, consensus building, and mutual trust are all necessary during negotiations to turn a combative scenario into a resolution. To avoid, manage, and resolve conflicts, regional and sub-regional organizations are essential in mediating disputes between disputing parties. This article explores the AU-led mediated peace accord on the bloody conflict between the Federal Democratic Republic of Ethiopia and the Tigray People's Liberation Front, using the Pretoria Peace Accord as a case study. Using a technique of content analysis, the research critically evaluates the existing body of literature while exploring the subject in depth. The conclusions of the study indicate that the African Union (AU), through the efforts of Olusegun Obasanjo and other dignitaries, had a fundamental role in facilitating compromise and mutual confidence between the TPLF and the central government of Ethiopia in supporting the Pretoria peace agreement. The article concludes that the Pretoria Accord proves that negotiated peace would most probably give minimum negative peace, where no direct violence is allowed or exists. The article further suggests that regional organizations play an essential role in resolving conflicts, making sure they can, always, really provide effective arbitration of a given conflict between parties. Reaching the agreement and sustaining it entailed continuous

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## An Ethnobotanical Assessment of the Flora in Rampur Forest Division, Shimla District, Himachal Pradesh: Traditional Uses, Threats, and Management Strategies

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### ARTICLE INFO

**Key words:** Ethnobotany, Traditional Knowledge, Biodiversity Conservation, Community Engagement

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### ABSTRACT

This study focuses on the documentation and identification of the flora in the Rampur forest division of Shimla district, Himachal Pradesh, highlighting its ethnobotanical uses, traditional knowledge, cultural significance, prevailing threats and ongoing conservation efforts. Local floral diversity serve multiple uses, primarily medicinal, but their traditional uses also extend to food, fodder, fuel, and various cultural practices, often intertwined with magico-religious beliefs that help in conservation. This heritage, however, is under severe threat from habitat degradation, over-exploitation, climate change, developmental projects, and the erosion of traditional knowledge due to modernization and diminishing intergenerational transfer. The study highlights the urgent need of the community engagement and various conservation strategies to safeguard both the flora and valuable indigenous knowledge systems. In the present study, 42 plant species ethnomedicinal plants belonging to 32 families and 40 plant species of other ethnobotanical uses belonging to 23 families were documented. All the 82 plants are arranged in alphabetical manner with botanical names, local names, family and their ethno botanical uses are documented in two tables.

### Introduction:

Himachal Pradesh is a hilly state situated in the Indian Himalayan region, which is one of the youngest mountain systems in the World lying between 30.22' to 33.12' North latitudes and 75.47' to 79.04' East longitudes. The area of the state is 55,673 km<sup>2</sup> with almost mountainous elevations ranging from 350-6500 m above the mean sea level. Himachal Pradesh is renowned for its rich biological diversity, having approximately 3245 plant species, constituting about 7.32% of India's total flora (Bhardwaj *et al.*, 2017). Shimla district of Himachal Pradesh is a critical biodiversity hotspot, elevating the importance of ethnobotanical studies and conservation

efforts in this region (Singh & Thakur, 2014). Ethnobotanical information is paramount for the conservation of both biodiversity and cultural traditions. Wild plants are an integral component of Himalayan culture and traditions, contributing extensively to their economic sustenance and daily requirements (Rana, Bhatt, & Lal, 2019; Anchal Thakur *et al.*, 2024). The systematic documentation of ethnobotanical knowledge is essential for the conservation and sustainable utilization of biological resources (Chauhan & Bishu, 2024). Ethnobotanical flora and traditional knowledge of Himalayan region face multiple threats. Urban expansion, overharvesting, deforestation and climate change disrupt local ecosystems, reducing biodiversity. Lack of documentation

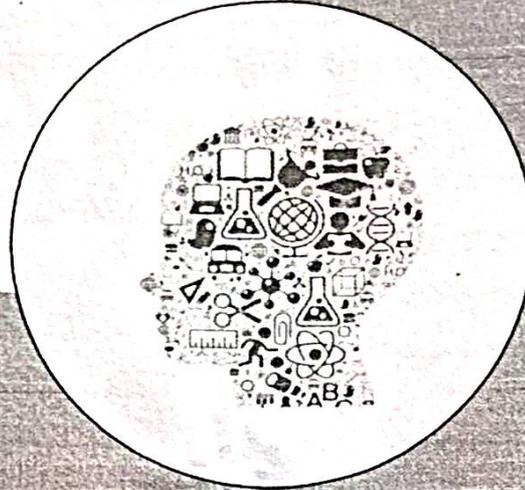
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## Relevance of Gandhian Philosophy and Non-Violence in Achieving Global Peace

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### Abstract:

Mahatma Gandhi's philosophy and practice of non-violence remain profoundly relevant in today's conflict-ridden world. As humanity grapples with war, terrorism, inequality, and environmental degradation, Gandhian thought offers a timeless ethical and spiritual framework rooted in truth (Satya), non-violence (Ahimsa), tolerance, and moral courage. Non-violence, according to Gandhi, is not passive submission but an active force of love and compassion, capable of transforming adversaries into allies through dialogue, understanding, and mutual respect. The core of Gandhian philosophy lies in self-purification, self-discipline, and the pursuit of truth through peaceful means. His techniques of Satyagraha and civil disobedience were not only effective tools in India's freedom struggle but also served as a moral model for global peace movements. Leaders like Martin Luther King Jr., Nelson Mandela, and the Dalai Lama have drawn inspiration from Gandhi's principles in their respective movements for justice and equality. In an age dominated by materialism, aggression, and intolerance, Gandhi's emphasis on simplicity, ethical living, and the interconnectedness of all beings provides a roadmap for sustainable and inclusive peace. Furthermore, integrating Gandhian principles into global policies, education systems, and social movements can nurture a culture of non-violence, empathy, and mutual coexistence. As global peace remains a shared aspiration, Gandhian philosophy stands as a powerful reminder that enduring peace can only be built upon the foundations of justice, truth, and non-violence.

**Keywords:** Non-Violence, Global Peace, Satyagraha, Moral Leadership, Truth, Civil Disobedience, Social Justice, Tolerance, Peacebuilding.

As the world stands at a crossroads marked by conflict, chaos, and suffering, Gandhi's timeless philosophy endures as a beacon of hope and moral clarity. Gandhi's teachings on non-violence (Ahimsa) and truth (Satya) continue to offer a deeply rooted ethical and practical path towards achieving sustainable global peace. As the world grapples with war, civil unrest, terrorism, and ecological challenges, Gandhi's holistic worldview—emphasizing personal transformation, moral integrity, and collective well-being—provides both inspiration and a framework for action. Gandhi's philosophy is grounded in Indian spiritual traditions, particularly those of Hinduism, Jainism, and Buddhism. Non-violence, for Gandhi, was not simply the absence of physical violence but an active force rooted in love, compassion, and forgiveness. He believed that one must be willing to suffer rather than inflict suffering. His concept of truth was deeply spiritual, encompassing not only honesty in speech but a commitment to ethical living and self-realization. Gandhi famously wrote, "There is no God higher than Truth" (Gandhi 1927:6).

Gandhi offered the world a timeless message: that truth and non-violence are the highest ideals humanity should strive for. He interpreted

truth in a broad and inclusive sense, believing that a person must be honest in thought, action, and intention. Throughout his personal and public life, Gandhi constantly tested his commitment to truth, making his entire life a journey of continuous experimentation with it. If Gandhian ethics could be summed up in a single word, that word would be Ahimsa. Though he considered Satya (truth) the supreme value, Gandhi's name is more commonly associated with Ahimsa, or non-violence (Reddy 2009: 371).

Truth and Ahimsa formed the foundation of Gandhi's moral philosophy. To him, Truth is God, and Ahimsa is love—since God is love, realizing truth is akin to realizing God. This realization, he believed, could only be achieved through non-violence, love, and selfless service to others. While Gandhi once said, "God is Truth," he later revised it to say, "Truth is God," reflecting his belief that Truth is the ultimate goal, and non-violence is the path to reach it. Ahimsa, a core principle of Hinduism and related traditions, was central to Gandhi's worldview (Mathews 1989: 70).

Gandhi advocated practicing Ahimsa not just in thoughts, words, and actions, but also in one's dietary habits. He believed that what we eat and drink has a significant impact on our physical health

# RELEVANCE OF GANDHI'S VISION IN MODERN TIMES: ETHICAL MEANS, NOBLE ENDS, AND THE ESSENCE OF SATYAGRAHA

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## Abstract

*Mahatma Gandhi's philosophy centered on the inseparable connection between means and ends, emphasizing that ethical methods are essential to achieving just outcomes. He believed that noble goals must be pursued through moral and nonviolent means, as unjust methods would corrupt the final result. Rooted in Ahimsa (nonviolence) and Satyagraha (truth-force), his approach to resistance was based on integrity, self-suffering, and dialogue rather than aggression. Gandhi's ethical vision was influenced by Vedic teachings, particularly the Rigveda and Upanishads, which emphasize truth, nonviolence, and righteousness. As the leader of India's independence movement, Gandhi's nonviolent resistance inspired millions and demonstrated the power of moral strength in social and political struggles. His philosophy extended beyond freedom from colonial rule, advocating for social reforms such as caste abolition, communal harmony, women's empowerment, and rural development. Satyagraha became a universal tool for nonviolent resistance, influencing global movements for justice, including those led by Martin Luther King Jr. and Nelson Mandela. Gandhi's teachings remain relevant in today's world, offering solutions to conflicts driven by violence, greed, and division. His emphasis on ethical leadership, social justice, and holistic development serves as a guiding principle for contemporary struggles. His legacy continues to inspire civil rights, environmental activism, and global peace movements, proving that nonviolence, truth, and justice are timeless values. Gandhi's life exemplifies the power of personal sacrifice, moral courage, and unwavering commitment to truth as a means to achieve a more equitable and harmonious society.*

**Keywords:** Satyagraha, Non-violence, Truth, Ethical leadership, social justice, Ahimsa, Moral courage

## Introduction: Gandhi's Vision

Mahatma Gandhi's philosophy was centered around a profound belief that the path to achieving any goal must be as morally upright as the goal itself. His concept of achieving goals was not merely about the desired outcome but about the ethical means employed to reach it. This principle of aligning means with ends became the cornerstone of his leadership and activism, and it underpinned his resistance against British colonial rule, as well as his efforts in social reform. For Gandhi, the idea that the means used to achieve a goal must reflect the same ethical standards as the goal itself was a revolutionary concept. He argued that adopting immoral or unjust means would ultimately render the ends tainted, no matter how noble they appeared. This was in contrast to many traditional political strategies where the focus was largely on the end result, often overlooking the ethics of the methods used. Gandhi's stance was grounded in his belief in *Ahimsa* (nonviolence) and *Satyagraha* (truth-force), both of which required individuals to practice restraint, integrity, and compassion, even in the face of oppression or conflict.

Mahatma Gandhi's entire life was devoted to social, moral and religious activities both in India and abroad. He took up all problems of life with great sincerity and tried to solve them with the purest possible means. Gandhi was one of the most respected spiritual and political leaders of the twentieth Century. He helped to free Indian people from British rule through nonviolent resistance, and is honoured by Indians as the father of the nation. Gandhi was charismatic person, who had the ability to reduce resistance and win his love and respect with an attractive simplicity and honesty. One of Gandhi's most outstanding qualities, which makes him a great transformation leader of modern history. Gandhi has become an iconic figure. His life and thoughts are well documented over four hundred books, Journal, studies and analyses, commentaries, anthologies and bibliographies have been published in several languages.

Gandhi's vision of ethical means leading to noble ends, particularly through *Satyagraha*, finds deep roots in Vedic thought. The Rigveda and Upanishads uphold *Satya* (truth) as supreme, with



Review

# Magnesium ferrites and their composites based photocatalysts: Synthesis approaches, effect of doping, and operational parameters on photocatalytic performance for wastewater remediation

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## Abstract

In recent years, increased discharge of toxic effluents into water bodies has severely harmed ecosystems and human well-being. Various techniques are employed to remove contaminants, among which photocatalysis have proven to be the most environment friendly and effective technique. This review focuses on  $MgFe_2O_4$ , an exceptional photocatalyst owing to their small band gap, spherical shape, magnetic responsiveness, stability, reusability, cost-effectiveness and small crystallite size. We have covered comprehensive comparison of research studies from the past decade to assess. Magnesium ferrite's photocatalytic potential in pure, doped, and composite forms. Along with synthesis methods, degradation mechanisms, and shortcomings explained in detail. Furthermore, we have highlighted the enhanced photocatalytic capability of doped  $MgFe_2O_4$  and their nanocomposites towards the various organic contaminants upon visible light irradiation under a comparatively short period of time. Factors like cation distribution, dosage, pH, as well as methods for recovery and reuse are discussed to aid in production of more efficient photocatalysts. There has been a lack of information on the techniques that can be used to overcome the various shortcomings of  $MgFe_2O_4$  ferrite. Hence, we have accentuated on bringing forth such advanced techniques that would aid in driving the researchers' attention towards the practical and industrial application of the hybrid  $MgFe_2O_4$  nanoparticles. Lastly, the research gaps and industrial need of  $MgFe_2O_4$  ferrite-based materials were addressed to offer a concise view.

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**Keywords:**  $MgFe_2O_4$  ferrite; Composites; Photodegradation; Wastewater remediation; Pollutants.

**Abbreviations:** SFNP, Spinel ferrite nanoparticles; MFNP, Magnesium ferrite nanoparticles; MFNC, Magnesium ferrite nanocomposites; GCMS-, Gas chromatography-mass spectrometry; FE-SEM, Field emission – Scanning electron spectroscopy; SQUID, Superconducting quantum interference device; TEM, Transmission electron microscopy; SEM, Scanning electron microscopy; EDX, Energy dispersive x-ray; M-H loop, Magnetic hysteresis

loop;  $M_s$ , Saturation magnetisation;  $M_r$ , Remanent magnetisation;  $H_c$ , Coercivity.

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# Linear polarization of $L_3$ sub-shell X-ray lines for some high-Z elements

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**Abstract:** In this paper, the degree of polarization of the fluorescent L X-ray lines  $L_I$ ,  $L_{\alpha_1}$  and  $L_{\alpha_2}$ , is studied theoretically with respect to incident energy for some high-Z elements from tungsten to Uranium. The linear polarization for each characteristic line is evolved through alignment parameter assessed by nonrelativistic dipole approximation (NDA) in a point Coulomb potential ( $A_{20}$ ), and accommodating the effect of screening in a screened Coulomb potential ( $A_{20}^*$ ) and analytical perturbation theory ( $A_{20}^{**}$ ). The values of degree of linear polarization predicted using alignment parameters ( $A_{20}$ ,  $A_{20}^*$  and  $A_{20}^{**}$ ) are not exactly the same as reported by Kämpfer et al. (Phys Rev A 93:033409, 2016) but the trends are almost the same. Since alignment is model sensitive, therefore, the degree of linear polarization will also be dependent on the theoretical approximation/model used. For  $L_I$  lines, polarization is found to be in the range (12 to 43) %, whereas for the  $L_{\alpha_1}$  line, the ultimate vigorous line of the L-shell emission, the estimated polarization is positive with value range from (+ 2.5 to + 7.5)% and for the  $L_{\alpha_2}$  line the polarization is negative with value range from (– 9.5 to – 27) %. These calculations are in exemplary compromise with the earlier theoretical results and manifest barely a feeble vulnerability of polarization on the vibrancy of the incident radiation. The present polarization trends show resemblance with the results of Kämpfer et al. (2016) and Özdemir et al. (Appl Radiat Isotopes 69:991, 2011), although the values are not absolutely matching.

**Keywords:** Linear polarization; Alignment parameter; Photoionization; Characteristic X-ray

## 1. Introduction

When a photon of suitable frequency strikes an atom, it may lose an electron leading to excitation of the atom. Such an excited atom may get stabilization by emitting one or more characteristic X-rays. The decayed radiations possess some angular and polarization properties, which are characterized by population of magnetic substates of excited ion which in turn depends on mode of ionization [1–3]. Besides studying characteristic X-rays more efforts are also required to investigate linear polarization and angular distribution of characteristic radiations excreted through photoionization of atoms.

For last few years analysis of inner shell photoionization of atoms has created a lot of interest among researchers as

these processes can play an important role in understanding radiation sources like accretion disks and binary stars [4–6]. Due to advances in high intensity light sources like extreme ultra violet (EUV), theoretical study of inner shell photoionization may provide a new horizon for understanding relativistic and non-dipole outcomes in high-Z atoms. Mehlhorn [1] was first to study polarization of characteristic X-ray lines. He showed that unequal or nonstatistical magnetic substates can be created using a beam of particles for atomic states having total angular momentum quantum number ( $J$ )  $> \frac{1}{2}$ . This unequal vacancy population among magnetic substates leads to alignment and hence polarization. Flügge et al. [2], theoretically studied alignment of atomic states following photoionization with unpolarized photons. This alignment of atomic states leads to alignment and polarization of characteristic X-rays. Angular distribution and linear polarization can be studied using alignment parameters, which in turn depend on structure of atom, energy of

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## ***1947 Partition Archive: Contextualising the Narratives of Trauma and Postmemory of the Community of Survivors***

**Aalisha Chauhan**

### **Abstract**

Over a period of seven decades after the Partition of India, the survivors (and their younger generations) of the event have created a community of post memorial trauma survivors. The research paper endeavours to study this community of survivors of postmemorial trauma of Indian Partition through selected oral histories available on *1947 Partition Archive*. The on-line archive contextualises the memories of those who have been a part of the postmemorial trauma of Indian Partition. These oral histories reiterate a common theme that resonates with Partition histories from 1947 to the present day: the marginalisation of the common man, nostalgia for the lost homeland and a state of perpetual fear. This research seeks to study the role of memory in reinterpreting the community of traumatic survivors and their succeeding generations and providing a varied set of identities, against the backdrop of Indian Partition. It borrows the concept of post-memory by Marianne Hirsch to study the relationship the “generation after” bears with the trauma of survivors before them. The study will utilise the methodology of qualitative content and discourse analysis. It further aims to understand the relationship between memory and history and its impact on the South Asian community.

**Keywords:** 1947 partition; Collective trauma; Cultural memory; Intergenerational trauma; Postmemory; Oral histories.

Inheritance of home navigates through the ever-changing dimensions of family spaces and belongings across borders. Family is the foregrounding unit in an individual’s quest for identity. From family comes associations, ethnicity, race and roots. A family unit represents an individual’s identity wherein he/ she inherits certain character traits, cultural norms and tra-

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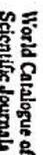
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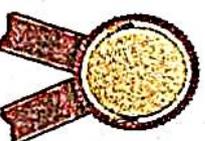
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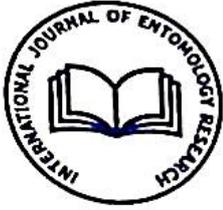


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# INSECT POLLINATORS DIVERSITY

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## *Biofortification: A Strategic Approach to Combat Micronutrient Malnutrition*

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### Abstract

Biofortification is defined as the dietary enrichment of targeted staple crops with specific micronutrients by breeding, transgenic approaches, and agronomic management. Biofortified crops generated by these approaches in a variety of food crops (cereals, legumes, tubers, and vegetables) have made substantial contributions to improving nutritional status and public health. Among numerous biofortified food crops, high-iron and high-zinc staple crops and provitamin A-rich crops are being efficiently disseminated to developing countries for scaling up and improving lives of millions of people around the world. These achievements in biofortification research are encouraging and will help in combating hidden hunger caused by the

chronic dietary deficiency of essential micronutrients in the human population.

**Keywords:** *Biofortification, micronutrients, transgenic approaches, hidden hunger*

### Introduction

Over the past two decades, there has been a burgeoning interest in biofortification as a new key to preventing micronutrient malnutrition. Micronutrient malnutrition (hidden hunger) is defined as the chronic insufficient intake of key vitamins and minerals and affects nearly 2 billion people worldwide, particularly in low- and middle-income countries. Children and pregnant women are the most vulnerable and are most affected in their cognitive, immune, and physical development. Mineral and vitamin deficiencies (hidden hunger) are one of the most serious public health problems in many developing



# Impact of Cu and La on the structural, morphological, magnetic, photocatalytic, and antibacterial traits of cobalt spinel nanoferrites

Gaurav Katoch<sup>1,12</sup> · Rohit Jasrotia<sup>2,3</sup> · Anant Vidya Nidhi<sup>4</sup> · Ankit Verma<sup>5</sup> · Sachin Kumar Godara<sup>6</sup> · Pradip K. Maji<sup>7</sup> · Afzal Hussain<sup>8</sup> · Saad M. Alshehri<sup>9</sup> · Jahangeer Ahmed<sup>9</sup> · Abhishek Kandwal<sup>2</sup> · Gagan Kumar<sup>10,11</sup>

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## Abstract

The multifunctional copper and lanthanum doped  $\text{CoFe}_2\text{O}_4$  nanoferrites of chemical formula,  $\text{Co}_{1-x}\text{Cu}_x\text{La}_y\text{Fe}_{2-y}\text{O}_4$ , ( $x = 0.0-0.04$ ;  $y = 0.0-0.03$ ) were fabricated via the sol-gel auto-combustion (SG) approach to investigate the optical, magnetic, micro-structural, photocatalytic, and antibacterial traits. X-ray diffraction analysis verified the formation of a cubic phased structure for the synthesized materials with no additional impurities. The SEM pictures of  $\text{CoFe}_2\text{O}_4$  and  $\text{Co}_{0.97}\text{Cu}_{0.03}\text{La}_{0.02}\text{Fe}_{0.98}\text{O}_4$  samples show the spherical shape like grains having a grain size of 90.98 and 62.74 nm. In the Raman spectra, five Raman active modes were seen in range of 200–800  $\text{cm}^{-1}$  which gives a strong validation toward the spinel cubic symmetry. According to magnetic traits, a soft magnetic behavior in the values of saturation magnetization ( $M_s = 81.32-104.61$  emu/g) and retentivity ( $M_r = 35.80-49.03$  emu/g) with a large coercivity ( $H_c = 1394.52-1892.79$  Oe) was found. With the Cu and La substitution, the band gap drops from 1.73 to 1.48 eV. Based on the photodegradation study, the doped ferrite nanomaterials performed better under the specific reaction conditions (catalysts dosage: 0.03g, dye dosage: 10  $\text{mgL}^{-1}$ , pH: 4). The  $\text{Co}_{0.96}\text{Cu}_{0.04}\text{La}_{0.03}\text{Fe}_{0.97}\text{O}_4$  nanoferrite shows the higher photocatalytic performance of 93.75% due to its smaller energy band gap. The photodegradation efficiency of  $\text{CoFe}_2\text{O}_4$  doped with Cu and La against the Congo red (CR) dye has increased from 87.08 to 93.75% in 60 min of natural sunlight irradiation. Throughout the 5 repeated reuse cycles, the catalyst efficacy did not noticeably decline. In contrast to the undoped  $\text{CoFe}_2\text{O}_4$  and doped  $\text{Co}_{0.97}\text{Cu}_{0.03}\text{La}_{0.02}\text{Fe}_{0.98}\text{O}_4$  nanoferrites which exhibited no zone of inhibition (ZOI) for the *Staphylococcus aureus*, the developed  $\text{Co}_{0.98}\text{Cu}_{0.02}\text{La}_{0.01}\text{Fe}_{0.99}\text{O}_4$  and  $\text{Co}_{0.96}\text{Cu}_{0.04}\text{La}_{0.03}\text{Fe}_{0.97}\text{O}_4$  nanoferrites showed ZOI against the *Staphylococcus aureus* bacterial strain. With all excellent photodegradation, and antibacterial traits, the undoped and Cu/La doped cobalt nanoferrites works as a new door for environmental and biological applications.

**Keywords** Cobalt nanoferrite · Cu and La substitution · Congo red degradation · Antibacterial investigation · Wastewater treatment

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