Semiconductor Cobalt Ferrite Extracted from Various Leaves, Plays as Transposon Bullet, are Frequently Utilized in Magnetic-Based Drug Delivery: A Green Synthesis Methods of Spinel Ferrite

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Received: 03 July 2023/ Revised: 12 July 2023/ Accepted: 20 July 2023/ Published: 31-07-2023

Abstract— *Green Synthesis methods of cobalt ferrite (CoF) and spinel ferrite from many leaves and fruit peels is not only a next-generation (NG) raw material of pharma manufacture, but also better well-being, and in all parts quality of life. B20/G20 negotiation transaction is a now market share of pharma economic besides for diagnosis/ energy/ capacitor/ battery nickel ferrite based on semiconductor. SWCNT, DWCNT, and MWCNT is a capacitors, and semiconductors (supercapacitors and superconductors) are bioelectric power matter. Knowing our potential and harm in taking care of our wet-warm land nanosafety, nano security, and nano defense of one- earth, is the aim of this study.*

Method: *Review article digging from Science Direct, EBSCOhost, and Google Scholar search engine with keywords: Semiconductor cobalt ferrite extracted from many leaves.*

Result: *Different semiconductor frequencies/wavelengths of cobalt ferrite, nickel ferrite, Ag ferrite, and many other spinel ferrites with green synthesis methods.*

Discussion: *Nano-carrier/ nano-vector cobalt ferrite Nano Particles (CoFNPs) as semiconductor depends on size, structure, pH, etc.*

Conclusion: *The pathophysiology of natural nano-vector in tropical rainforest areas has to be taken care of in one-earth Industry 4.0 with Society 5.0. The value of these nanoparticles should be protected by law especially are associated with RNAi, sepsis, LGBTQIA et al. nowadays iceberg laden of health problems.*

***Keywords— Cobalt ferrite, Doping, Mantids, Magnetic nanoparticles, Synzygium polyanthum*.**

I. INTRODUCTION

1.1 Problem

Green Synthesis methods of cobalt ferrite (CoF) and spinel ferrite from many leaves and fruit peels are not only a next-generation raw material of pharma manufacture but also improve well-being and overall quality of life. B20/G20 negotiation is a now market share or pharma economic besides for detection/diagnosis/ energy/ capacitor/ battery nickel ferrite, based on the semiconductor.[1,2,3,4] Biosensors have proved extremely large useful in vital areas, such as in healthcare, environmental monitoring, security, pharmaceutics, food security, and forensics.[2] SWCNT, DWCNT, and MWCNT are capacitors, and semiconductors (supercapacitors and superconductors), which are bioelectric power matter.[3,4] In the last few decades, nanosized spinel ferrites with the structure M Ferrite, where M is a divalent metal cation of Cu, Co, Ni, Zn, Mn, Mg, etc., have received broad attention, and the studies are about their magnetic and electrical properties. The semiconductor Excitation/ Emission (Ex/Em) of this nanocrystal biopolymer with profound chemical and thermal stabilities is the focus of this study.

1.2 Aims

Knowing our potential and harm in taking care of our wet-warm land nano-safety, -security and -defense one-earth, which is prone to be in high prevalence nowadays. Sepsis,[4] Hypospadia and Congenital Adrenal Hyperplasia (CAH),[5] LGBTQ,[6] Bipolar,[7] the role of non-viral vectors,[8] and the bioelectric transfection and transposon bullet-High Relative Humidity,[9] become the laden health problem in the tropical rainforest area. We hope that this review study provides useful information to help translate this novel therapy or diagnostic agent be fast to the right clinical application market share.

II. METHOD AND RESULT

2.1 Method

Review article digging from Science Direct, EBSCOhost, and Google Scholar search engine with keywords of semiconductor cobalt ferrite extracted from various leaves (semiconductor AND cobalt ferrite AND leaves).

2.2 Result

Different Semiconductor frequency/wavelength of cobalt ferrite, nickel ferrite, Ag ferrite, and many other spinel ferrites, with green synthesis methods are found as follow:

2.2.1 The different sizes, shapes, and crystallinity by various techniques.[10]

The frequency/wavelength of the semiconductor could be modified by doping, it is the principle of successful transfection in a wet-warm climate area, or laboratory incubator. The transfection is naturally taken place in the tropical rainforests, but in particularly made in the pharma manufacture for cancer and viral therapy. This review is to reveal the effort in prestige Next Generation (NG) medicine with the raw material extracted potentially from Moringa oleifera (*kelor*) and Syzygium polyanthum (*salam*) as cobalt ferrite is a non-viral nano-carrier or nano-vector RNAi transfection.

Among these spinel ferrite materials, cobalt ferrite is a typical superparamagnetic ferrite (small nanometer-size). In bigger sizes, cobalt ferrites have a high coercivity, moderate saturation magnetization, excellent chemical and mechanical stabilities, electrically insulating behavior, good magnetostrictive possession, and ferrimagnetic with a high Curie temperature. At normal room temperature, if this physical-mechanical occurs (in small nanoparticles), it is describing superparamagnetic cobalt ferrite ($CoFe_2O_4$).

2.2.2 Interference: cobalt ferrite as semiconductor

Tamboli offers comprehensive knowledge on how to choose suitable natural resources for the green synthesis of nano cobalt ferrite and the benefits of this approach distinct to conventional methods.[11]

Magnetic NPs, one of them, cobalt ferrite is the most of great importance and studied superparamagnetic NPs. Green synthesis NPs are environmentally benign synthetic methods, that became necessary to reduce environmental and occupational hazards. The reviewed recent advances in synthesizing cobalt ferrites nanoparticles and their composites using several scientific search engines are very useful.

2.2.3 Comparison

The different efforts to make different frequencies/wave-length from green synthesis methods of CoF, NiF, AgF (SpinelF), etc. Bioactive components of plant extracts with reducing, capping, and stabilizing ability, and mechanistic route used for cobalt ferrite NPs synthesis. A review on plant extract-based route for the synthesis of cobalt NPs: photocatalytic, electrochemical sensing and antibacterial applications.[12.] The run-up of cobalt NPs could be in several routes incl. chemical wet processing, thermal reduction, micro-emulsion techniques, and biosynthesis extraction of natural plants. It is research done now in green and sustainable chemistry.[12] Effect of cobalt ferrite ($CoFe_2O_4$) NPs on the growth and development of Lycopersicon lycopersicum (tomato plants) has been notify.[13.]

Formation mechanism and lattice parameter research for copper-substituted cobalt ferrites from Zingiber officinale and Elettaria cardamon seed extracts using biogenic route is a materials.[14.] The extracted seed has a copper content of CoFNPs was analyzed by XRD, SEM, EDX, UV-Vis., PL, FE-SEM, FTIR and photocatalytic activity.[14]

III. DISCUSSION

Different effort in the making of different frequency/wave-length from green synthesis methods of CoF, NiF, AgF etc. (spinel ferrite) has been denounced. Nano-carrier/ nano-vector cobalt ferrite nano particles (CoFNPs) as semiconductor depends on size, structure, pH, etc. These NPs, especially CoFNPs as semiconductor, doped, transported RNAi, SWCnT, fast delivery is as follows:

3.1 Semiconductor, Capacitor, Dielectric

Ecofriendly green and sustainable chemistry benign synthetic methods became necessary to lessen environmental and occupational health hazards.[11] Green synthesis methods are now widely broadly applied in the synthesis of nanomaterials in science and technology utilizations. Synthesizing of CoFNPs and their composites using various search engines has been reviewed.[11]

Mechano-synthesis, characterization, and magnetic properties of nanoparticles of cobalt ferrite, $CoFe_2O_4$.[16] This chemical material has a magnetic escalate with the decreasing particle size. Longer-term milling induces particle growth characterized by sharpening of the Bragg peaks and a rise of the blocking temperature, while prolonged milling results in some cobalt metal.[16]

Caldeira reports the correlation of synthesis parameters to the structural and magnetic properties of spinel cobalt ferrites ($COFe_2O_4$) associated with an experimental and statistical study.[17] It is improving cobalt ferrite for trading process on global market share.

Okra extract assisted green synthesis of $CoFe_2O_4$ NPs and their optical, magnetic, and antimicrobial properties.[18] Synthesis of cobalt ferrite NPs using Okra plant gel as a reducing agent rich the production. Route based on "localized" microwave heating to synthesize NPs present high purity single phase CoFNPs are declared.[18]

3.2 Doping Cobalt, Zn, Ni, Mg

Green synthesis and Characterization of ZnO-$CoFe_2O_4$ semiconductor composites set up by using a hydrothermal method and *rambutan* peel extract. The photocatalytic performance of composites under solar light for reduction of Direct Red 81 in the *batik* garments production with degradation percentage reaching 99.6% after 2 hours approached.[19] Synthesis of cobalt ferrite precursors, then could be doped with Zn, and Ni in this report.[19]

Magnesium ferrite and cobalt doped magnesium ferrite ($Co_{0.8}Mg_{0.2}Fe_2O_4$) spinel NPs in biomedical applications using the low-temperature combustion synthesis present relatively high antibacterial effect on Escherichia coli and Staphylococcus aureus propose its potentials in the treatment of infections common accompanied with these microorganisms.[20]

The Structural and Optical Properties of zinc ferrite Nanoparticles synthesized via a green route.[21] The crystallite size calculated from the Debye-Scherrer equation showed an increase from 14 nm-20 nm with the increase in calcination temperature.[21]

3.3 RNAi type in Cancer and viral therapy

3.3.1 Transposon bullet supercapacitor[8,9]

The different types of RNAi molecules are miRNA, si RNA, and short hairpin RNA (shRNA). RNAi molecules submit into cells initiate the degradation of complementary mRNA molecules via the cells' internal machinery. Nano-based delivery of RNAi in cancer therapy, RNA molecules block gene expression. RNAi is one method of regulating target genes. Two main approaches for the delivery of RNAi molecules have been developed: viral and non-viral vectors. The use of nanoparticles for RNAi molecules delivery is traited to unique benefits provided by nanoparticles in comparing to other carriers, such as viral vectors, non-viral chemical vectors, and mechanical non-viral vectors as electroporation, ultrasound, gene gun, cobalt ferrite NPs, etc.[8,9] By automating the PCR system to sense the extracted viral RNA could also be done.[1]

Cobalt ferrite is utilized as an efficient catalyst for reaction under mild and green conditions. This green catalyst was separated easily by an external magnet. The recycled catalyst was reused several times without significant loss of catalytic properties.[22]

Aluminum (Al) and PEG Effect on Structural and Physicochemical Properties of $CoFe_2O_4$. Al doped CoFNPs led to a decrease in crystallite size, lattice parameter, elastic constants, and magnitude of moduli. This $CoFe_{2-x}Al_xO_4$ have been synthesized by the sol-gel method.[22]

Green synthesis of cobalt ferrite NPs using plant extracts were synthesized through the self-combustion method using aqueous plant extract.[23] A large number of plant extracts are used especially to get noble metal NPs, such as Ag, Au, Pt, and Pd.

Constitutes from plant extract, leaves, etc., are eco-friendly environment and cost-effective route,[23]

Cobalt ferrite ($CoFe_2O_4$) NPs synthesis exploit *binahong* (Anredena cordifolia (Ten) Steenis) leaves extract and the application as an anti-bacterial has also been reported.[24]

3.3.2 Drug / Gen Delivery System based on NP semiconductor-supercapacitor

The SWCNT, DWCNT, and MWCNT are capacitors, and semiconductors (supercapacitors and superconductors) are bioelectric power matter.[4,9,25]Advances and frontiers in Single-Walled Carbon Nanotube (SWCNT) electronics has been notify.[25]

Carbon nanocarriers pass siRNA to not breakage plant cells for efficient gene knockdown. This study establishes that nanotubes could bring through an extraordinarily great number of plant biotechnology applications that rely on RNA delivery to not decay cells.[26] This study establishes that nanotubes could enable a countless or extremely large number of plant biotechnology applications that rely on RNA delivery to not damage cells. Carbon nanocarriers present siRNA to intact plant cells for efficient gene knockdown. In addition, when bound to SWNTs, biomolecules are shielded from being degraded in the mammalian systems, display a sign of higher rank biostability contrasted to free biomolecules. Moreover, SWNTs have strong near-infrared (nIR) fluorescence inside the biological tissue transparency window, and to the greater distance side of the chlorophyll autofluorescence range, and thus make feasible tracking of cargo-NP complexes as far down in plant tissues.[26]

DNA-Carbon Nanotube binding mode establish the efficiency of CNT-mediated DNA delivery to intact plants. To the RNA, and genome engineering machinery to plant cells. It will give works to genetically modified plants for global food security, sustainable energy production, synthetic biology applications, and climate change capacity to recover quickly from troubles.[27]

Having great power vectors for human vaccine dispatched targeting cancer, and infectious diseases using polymeric NPs.[28] Based on non-viral vectors, Au NPs (nanoshells/ nanocages) are next nanocarriers enclose polymeric NPs, lipid-based carriers (liposomes/micelles), dendrimers, CnTs.[4,28.] Bolhassani portray polymeric vectors chiefly poly (lactic-co-glycolic acid) (PLGA), chitosan, and polyethyleneimine (PEI) as vaccine transmission system-associated DNA/RNA transfection.[28]

Reports in HepG2 cells, alter miRNA expression cap by Ag ferrite NPs (6 miRNAs) followed by AuF NPs (4 miRNAs) and SPIONs (2 miRNAs) bring about the highest changes of changes.[29.] Earliest study of SPIONs-miRNA methylation epigenetic promote laden problem – market share.[29]

3.3.3 Imaging agent based on NPs semiconductor Ex/Em

The different Excitation/Emission (Ex/Em) NPs semiconductor are reported as follow**:**

Superparamagnetism is different from standard transition since it occurs at a lower level of the Curie temperature of the material, and is used as an imaging agent semiconductor. One-step preparation of highly stable cooper-zinc ferrite NPs in water suitable for MRI thermometry has been reported.[30.] This Poly (ethylene glycol) (PEG) coated Cu-Zn ferrite NPs, in the presence of a strong temperature gradient shows a sharp correlation between the temperature and the image intensity, so this CuZn ferrite NPs can be used as a contrast agent for MRI thermometry, as force and brightness.[30]

Magnetic possession in cobalt ferrite NPs by wet chemical route have been reported,[31] with the synthesis and magnetic properties of cobalt ferrite ($CoFe_2O_4$) NPs set up by wet chemical route.[31] Semiconductor CoF extracted from many leaves, from fruit peels as transposon bullet.[8, 9] Green synthesis methods of $CoFe_2O_4$ and silver AgNPs exposure give effect on miRNA and global DNA methylation endothelial cells.[32] Green synthesis of metallic NPs using some selected medicinal plants from

Southern Africa and their biological applications is reported.[33] This is used as an antimicrobial, anticancer, drug delivery, contrast agent, and bioimaging agent, which is transformed the field of medicine into nano-medicine.[33]

Green synthesis of biocompatible superparamagnetic iron oxide-gold composite NPs for MRI diagnostic, hyperthermia, and photothermal therapeutic applications.[34] This Materials Chemistry and Physics are vast used for biomedical applications.[34] Gold ferrite NPs using aqueous leaf extract of a medicinal plant as nIR absorbing were used has been reported.[34.] Superparamagnetic cobalt ferrite as T2 contrast agent in MRI has been reported in the engineering and technology society.[35]

In addition, as an MRI agent, nickel ferrite and cobalt ferrite are good for gene silencing, expression, virus editing, and cancer treatment. It is as follows:

3.3.4 Nanoparticles Semiconductor SPIONs- Editing and Silencing

Since Editing CRISPR/Cas technology grow to be an extremely necessary tool for genome change made, the functional unit of the CRISPR/Cas system after a long time has to be present in the nucleus of target cells, using non-viral delivery using Au, Si NPs.[36]

NiF, and CoF are also used in silencing, increasing expression, and direct editing CRISPR/Cas9 of virus infection therapy. Non-viral delivery of the CRISPR/Cas system: DNA versus RNA versus ribonucleoproteins (RNPs) has been reported.[36] The use of Au, Silica, and Zn SPIONs has been reported.[36] This can be achieved by delivery of different biomolecular Cas9 and gRNA formats: plasmid DNA (pDNA), RNA, or Cas9 RNPs.[36]

Before the use of SPIONs, a novel non-viral vector-mediated gene delivery into mammalian cells by cationic lipid-nanoceria hybrids, a study of the cellular uptake mechanism.[37]

Green synthesis of biocompatible superparamagnetic iron oxide-gold composite NPs for magnetic resonance imaging, hyperthermia, and photothermal therapeutic applications.[38] Au ferrite using aqueous leaf extract has a high relaxivities ratio, indicating the potential of gold ferrite nanoparticles for a contrast agent. MRI of chicken tissue and poultry heart has confirmed this contrast enhancement performance.[38]

Cobalt ferrite is new applications in lithium-ion batteries, magnetic photocatalysis, and hyperthermia treatment.[23,34,38.] Caused by its chemical, thermal, and color stability, cobalt ferrite NPs are widely used in the ceramics industry.[23] These Al, Ag, Au, Pt, Pd, Li, complete the doped Co, Zn, Ni, and Mg in industry 4.0 forward to society 5.0 but should be aware to ARMGs using, where green synthesis cost-effective, also covered all energy supply.[4,23]

Aluminum doped cobalt ferrite as an efficient photocatalyst for the abatement of methylene blue.[39] At pH 11, using a 200 W visible light bulb and in 120 min, 93% methylene blue dye was degraded by using 0.1 $Al_{0.03}Fe_{0.17}O_{0.4}$.[39]

A physiologically based pharmacokinetic model to foresee the superparamagnetic iron oxide nanoparticles (SPIONs) accumulation in vivo.[40] Biodiversity of plant biosynthesis has a commitment future. Biodiversity in new fields of application in technology, pharmacy, and economy along with environmental policies has been registered and become the next table of Ex/Em. The development happened not only in Indonesia but also in other biodiversity-rich tropical countries. Indonesia is a global megadiversity hotspot.

Fast transfection of mammalian cells using superparamagnetic NPs under a strong magnetic field is reported. [41] This Superparamagnetic NPs used in mammalian cells are well for market share, and function as fast delivery of DNA into mammalian cells. Most complexes of plasmid DNA and polyethyleneimine (PEI)-coated SPIONs were internalized immediately.[41]

Superparamagnetic NP delivery of DNA vaccine at room temperature has been reported.[42] PEI was selected to modify the surface of SPIONs to contribute the delivery of plasmid DNA into mammalian cells caused by the polymer's affecting a large area buffering capacity via the "proton sponge" effect.[42] These SPIONs also have already been used as diagnostic agent.[42]

The outcome of this study is not only the raw material for pharma economic (with agarose gel) or doping but also in nature, the being mantids (orchids, leave, sticks) RNAi transposon transfection, are based on semiconductor in high relative humidity countries have to be known by all.

FIGURE 1: Green Synthesis: Moringa Oleifera Leaves (July 19, 2020)/ 3 Years) as Spinel Ferrites SPIONs Sources Based on Semiconductor Ex/Em

IV. LIMITATION

Power hindrance, stigma, label, sensitiveness, and industrial deafness, all become the SPIONs accumulation in vivo.[5,40] The nature SPION accumulation is not associated with laden diseases in the tropical rainforest areas, which could be a crime of omission by everyone by thinking as a fate. The using of many respective SPIONs of words, takes the importance of Bayesian analysis. Also, all types of miRNAs, DNA, and protein which transported by the SPIONs as a vector. Moreover, different size of SPIONs as a semiconductor has different Ex/Em which could not be considered equal. Domestic name of the same species of plants has also different local mentions, also the mantids and the part of the plants should be separated.

The technology which uses cellulose and collagen done by electrospinning machine in Industry 4.0 without Society 5.0 should stand toward SPION mammalian cells market-share.[41] Superparamagnetic nanoparticles delivery DNA vaccine[42] and also happens in nature[43] by NPs green synthesis. Easy and low cost to make, without doing the counting of metal nanoparticles from green synthesis for miRNA and NG drug delivery, and biological application in this study should be started from now on. Genetically modified organism (GMOs) in plants is now used for market share in global food safety, security, energy production, global synthetic biology applications, climate change, and economic crisis, to recover quickly from these nature or nurture difficulties. Analyze different sizes, shapes, and crystallinity CoF NPs from plants, extracted by various techniques have been recorded.[10]

V. CONCLUSION

The pathophysiology of natural nano-vector in tropical rainforest areas has to be taken care of in One-earth industry 4.0 with Society 5.0. The value of these nanoparticles should be protected by law especially those associated with RNAi sepsis, LGBTQIA et al. Different sizes, structures, pH, and Spinel Ferrite NPs methods in various leaves extract, fruit peels, will bear new map from the result of any result associated wave-length Excitation/Emission (Ex/Em) for cancer and viral therapy.

ACKNOWLEDGEMENTS

Support by Dr Rahyussalim, SpOT(K) as the head of FMUI research manager, who put my lost identity in the FMUI Research box. Support by Ministerial Decree of Research and Innovation Agency of the Republic Indonesia (BRIN), and Research and Technology and Higher Education of the Indonesian Government (*Kemendikbud)* under the SINTA ID 5990456 with medical education, biophysics, nanomedicine lecturing, expertise in BioMed Physics, allowing for the acquisition of the research infrastructure, is gratefully acknowledged. This work also benefits from the support of the IJOEAR & JPHRECODE journals, AIPI-(CRID-THROPID), ISAC, and SPIE association. The author (PKSM) greatly acknowledges the support under the IOC itinerant to disseminate sportsmanship, *man jadda wa jadda*: whoever strives shall succeed. It should do and trained all over the world. Fight the groomer and phishers, individually or in a group, continuously and sustainably.

CONFLICT OF INTEREST

The author declares no conflict of interest.

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