# Kelor, Salam, Pepaya, Binahong Mystery in RNAi Indigenous Vector Transfection: A Mystic Semiconductor?

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***Abstract—*** *Spinel ferrite extracted from leaves is the Next Generation (NG) drug-gene delivery, which is a prestige present by Pharma manufactures in cancer and viral diseases, but not aware of the nature physiology of orchids, leaves, and stick mantids, where the prevalence has been known high in the tropical rainforest countries. RNAi, a novel non-viral vector-mediated gene delivery into mammalian cells could be for silencing, increasing gene production, or editing the gene, also occurred in the laboratory incubator or in our large huge natural incubators such as tropical rainforests at night where relative humidity near 100% and high level of $CO_2$ more than 5%-10%, loss from leaves. This review is the first that reveal the physiology of natural nonviral vector RNAi based on cellular biophysics semiconductor truths, changing the mystic to a mystery of laden sociology and the health problem in wet and warm areas, high relative humidity condition.*

***Method:*** *Review articles done from Science Direct, EBSCO-host, etc. Keywords: cobalt ferrite and Moringa, broaden with other diction found in Bayesian network.*

***Result:*** *Nickel ferrites also known as one of the spinel ferrites (SF), are frequently utilized in magnetic-based drug delivery and contrast agents. Many types of methods of doping give different sizes, morphology, and physical features of magnetic NPs. All samples displayed superparamagnetic (SPM) behavior at room temperature, with no or negligible coercivity and retentivity.*

***Conclusions:*** *Semiconductor $CoFe_2O_4$ extracted from many leaves from the tropical rainforest area, act as a nano-carrier of RNAi in wet and warm tropical rainforest countries, are signed by mantids.*

***Keywords— Cobalt ferrite, Electromagnetic power, Moringa oleifera, Nano-carrier, Superparamagnetic (SPM) nanoparticles.***

## I. INTRODUCTION

*Binahong*[1] (Anredera cordifolia) heart leaf, *Salam* (Syzygium polyanthum) bay leaf,[2] Papaya (Carica papaya), *Kelor* (Moringa oleifera)[3,4,5] drumstick tree leaves extraction, is a Next Generation (NG) of nonviral vector-mediated gene delivery into mammalian cells.[6,7,8] $CoFe_2O_4$ (cobalt ferrite, CF) nanoparticle [9] and nickel ferrite (NiFe2O4, NiF),[10] is potentially superparamagnetic nanoparticles, act as a semiconductor which has electromagnetic power.

Besides gene delivery into mammalian cells, cobalt NPs also used in silencing, increasing expression of genes, and editing CRISPR/Cas9 of virus infection therapy.[11]

RNAi, a novel non-viral vector-mediated gene delivery into mammalian cells[12] could be for silencing, increasing gene production, or editing the gene, which could be occurred in a laboratory incubator, or in our large huge natural incubator such as tropical rainforest at night where relative humidity near 100% and high level of $CO_2$ more than 5-10%, by which $CO_2$ loss from leaves. That's why living plants could not place in the bedroom at night. This review is the first revealed natural nonviral vector RNAi based on cellular biophysics semiconductor NPs, open the mysticism and mystery of laden sociology and laden health problem in tropical rainforests hidden by stigma, mysticism, and sensitiveness by the family, or even by the village.[13]

This study aims to open the mystery of mystic nanoparticles (NPs) which have nano-economic power, which will complete the macro- and micro-economic global to recover together, recover stronger.

## II. METHODS

The search was done in 1st semester of 2023.

This review article digs from Science Direct, EBSCO-host, and other search engines, related references to Cobalt Ferrite and Moringa oleifera. Using keywords: Moring Oleifera and cobalt ferrite with Bayesian analysis and networks.

## III. RESULT

The potentiality of many tropical rainforests leaves powder had been reported to be Next Generation (NG) drugs gene delivery. Next Generation of nonviral vector-mediated gene delivery into mammalian cells has been reported.[6]

Meanwhile, orchid mantids and 'salam' (Syzygium polyanthum) bay leaf, has been reported as translational RNAi indigenous as an insect fact in tropical rainforest country area such as Indonesia, Thailand, and many other SEA countries, for a long-long time ago.[2]

*Kelor*, *salam*, *binahong*, papaya, etc. has been reported associated with cobalt ferrite, nickel ferrite, and spinel ferrites, which have functioned as Super Paramagnetic Iron Oxide Nanoparticles (SPIONs)[8,14] There are many various types of leaves as source of cobalt ferrites (CoF) and other spinel ferrites:

### 3.1 Cobalt Ferrites ($CoFe_2O_4$, CoF)[9]

Green synthesis of CoF nanoparticles (NPs) is an emerging material for environmental and biomedical applications.[9] Cobalt doping on NiF nanocrystals intensifies the micro-structural and magnetic properties, and both have a correlation. The smaller of the same type have different emissions of the semiconductor crystal.[10] It is like the radio wave of a transmitter, the smaller the semiconductor the higher the frequency, the shorter the lambda (wavelength). Gene delivery by CoF, NiF, and other spinel ferrites functions as semiconductors based.[14] Polymeric Nanoparticles: Potent vectors for vaccine delivery targeting cancer and infectious diseases.[15] Polymers used to form nanoparticles can be both synthetic and natural, using for drug delivery, imaging contrast agent, and detection of apoptosis.[15]

### 3.2 *Binahong* (Anredena cordifolia)

The synthesis of Cobalt Ferrite Nanoparticles using 'binahong' (Anredena cordifolia) has been reported as antibacteria.[1] A research has been done on the synthesis of $CoFe_2O_4$ nanoparticles using 'binahong' (Anredera cordifolia (Ten) Steenis) leaf extract. With comparison mol variation of $(Co(NO_3)_2.6H_2O$ : $(Fe(NO_3)_3.9H_2O)$ = 1:1 in 15 mL extract. The nanoparticles were characterized using XRD and SEM and tested for their antibacterial activities.[1] The NP size was 37.52 nm, which suggests is good as an antibacterial.

### 3.3 *Kelor* (Moringa oleifera/ MO)

The NPs size from the study of Almesiere has been reported as within the size range of 11-17 nm and 16-28 nm in groups with and without extracted MO leaf on green synthesis.[3]

It is the effect of 'kelor' (Moringa oleifera) leaf extract on the structural and magnetic of Zn doped Ca-Mg nano-SFs.[3] All samples present superparamagnetic behavior at room temperature, with no or negligible coercivity and retentivity. Abdul Karim et al also confirmed silver ferrites extracted from Moringa oleifera using ethanol 96%.[4] Desoky,[5] 2022, explore the impact of doping on the structure and low-temperature magnetic features of cobalt nano-spinel ferrite.

### 3.4 *Salam* (Syzygium polyantum)

The mantis form which is similar to 'salam' (Syzygium polyanthum) bay leaf has been reported as indigenous RNAi: camouflage in tropical rainforest climate areas.[2] And Das reported a novel non-viral vector-mediated gene delivery: an investigation of the cellular uptake mechanism.[6] Fast transfection SPIONs under a strong magnetic field has been reported by Chen in 2009.[8] Synthesis and magnetic properties of cobalt ferrite ($CoFe_2O_4$) NPs by wet chemical route has been prepared in 2007.[7]

### 3.5 *Papaya* (Carica papaya)

Nanotechnologies are utilized in the areas of medicine, agronomy, environments, communication, consumer possessions, chemistry, and energy, as well in industry 4.0 such as photovoltaic solar cell detectors thin films.[16]

Biosynthesis of $TiO_2$ nanoparticles by Caricaceae ('papaya') shell extracts are made for antifungal application.[16] Applied $TiO_2$ nanostructure of numerous surface morphologies could consist of nano prism, nanotube, nanobuds, quantum dot, nanoparticles, nanofilms, nanosheets, nanoplates, nanomicrosperes, nanopyramids, nano tetra-pods, etc.[16]

### 3.6 *Jambu biji* (Psidium guajava)

Removal of organic dyes from water (water treatment) and anti-microbial-based magnetic nanoparticles have been reported by Adhikari,[17] 2022. Green Synthesis of Iron Oxide Nanoparticles using Psidium guajava L. leaves extract for degradation of organic dyes and anti-microbial applications.[17] Structure, form, and electrical properties of CoF synthesis by solvothermal has been reported.[18] Hydrothermal synthesis of cobalt ferrite NPs have been reported on the structural and magnetic properties.[19,20]

## IV. DISCUSSION

From translational medicine of tropical rainforest leaves associated with the mystery of nano-carrier or nano-vector, a.k.a nanoparticles, the basic cellular biophysics will support the potentiality of spinel ferrite superparamagnetic properties. There are as follows:

### 4.1 Semiconductor-RNAi and Semiconductor nanocrystal-antibody

Structure analysis, morphological observation and electrical behavior of CoF synthesis by surfactant-free solvothermal.[18]

Hydrothermal route synthesis of spherical cobalt ferrite NP: synthesis characterization & optical properties,[19] and hydrothermal process on structural and magnetic properties of CoNi Ferrite are functionalized CNTs nanocomposites.[20]

A strong temperature relying on magnetic viscosity and coercivity, prone to zero on approach spin glass freezing temperature from below, then support the spin-glass state which results from magnetic dilution driven by diamagnetic $Zn^{2+}$and $Ti^{4+}$ ions leading to magnetic frustration. This is reported in Antiferromagnetic short-range order and cluster spin-glass state in diluted spinel $ZnTiCoO_4$.[21]

Hybrid materials give a great understanding of the part played of existing organic functions, metal nodes, and the presence of defects in metal-organic frameworks for the adsorption and sensing of phosphate. How a second component increases the adsorption efficiency, and advances the removal and identification of phosphate.[22]

Selective and sensitive turn-on fluorescent sensor for identifying the presence of phosphate in aqueous solution.[23]

### 4.2 Low-cost cobalt ferrite nanoparticles

Spinel nano-ferrites for a low-cost process for sustainable energy source based on spinel nano-ferrites for aqueous supercapacitors. A nano-ferrites as supercapacitor electrodes have been reported by Malale.[24]

There is a correlation between cation distribution and magnetic and dielectric properties of a substituted Fe-rich cobalt ferrite.[25]

Amazing sensitivity, cheap, high stability, great selectivity, and quick response at low temperature creates these sensors favorable for medical industries. Nano ferrite in biosensors.[26]

### 4.3 SPIONs[8,27]

Chen[8] 2009 has reported a fast transfection of mammalian cells using Superparamagnetic Iron Oxide Nanoparticles (SPIONs). A fast delivery of DNA into adherent and suspended cells was well-transfected with enhanced green fluorescent protein gene has been reported.[8] The transfection enhanced with the strength of magnetic field and the number of pulsing. The enhancement in transfection efficiency was about two-fold on average by pulsing in magnetic field on 0.6 Tesla three times.[8] Later, SPIONs has used to deliver DNA vaccine.[27]

### 4.4 Cobalt Ferrite dope

Cobalt Ferrite dope and nano-powder strontium-substituted CoF has been performed. [28]

MgF dope based on calcination temperature on the spin-spin relaxation time (T2).[29]

Lanthanum doping on microstructural, dielectric & magnetic properties of MnO.4ZnO.6CdO.2LaxFe1.8-xO4 ($0.0<x<0.4$).[30,31]

### 4.5 Cobalt ferrite nanoparticles for sensing/detector

Semiconductor cobalt ferrite nanoparticles for sensing phosphate ions in aqueous media and biological samples have been reported.[32]

Highly sensitive detection of phosphate using well-ordered crystalline cobalt oxide nanoparticles supported by multi-walled carbon nanotubes (MWCnT).[33] Single-wallet (SWCNT), double-wallet (DWCNT), MWCNT has been reported as the remarkable nanotechnology of Industry 4.0 in almost all aspects.[34] Rationale and trends of applied nanotechnology have also to be recorded.[35] Intrinsically conductive polymer hybrid bilayer films for molecular diagnosis of the Zika virus are published in Colloids and Surfaces B: Biointerfaces.[36]

### 4.6 Water treatment

Despite being used for sensing/detectors, cobalt ferrite is used for water treatment.[37] Zhu 2022 reports water treatment of organic dyes as a major source of industrial wastewater pollution used photocatalytic degradation. Using cobalt ferrite and dope to degradation efficiency.[38] Prepared plant roots, leaves, fruit peels, seeds, and biomass waste, are now widely used in organic dye degradation, heavy metal recovery, photoelectric fuel cell, antibiotic degradation, etc.[38] Hassan review provides up-to-date insight research on bioelectrochemical systems (BESs), which improves the removal of the antibiotic in an efficient way. Bioelectrochemical technologies are found promising.[39] Antibiotic wastewater from pharmaceutical industries that make antimicrobial resistance is needed for the ecosystem. The degradation rate of antibiotics increased, indicating good photostability. Current knowledge and future perspective in environmental engineering.[39]

Vamvakadis, 2020, report diverse surface chemistry of cobalt ferrite NPs to optimize Copper(II) removal from aqueous medial.[40] The nano adsorbents were quickly isolated from the solution by magnetic separation and regenerated easily by acidic treatment.[40]

### 4.7 Advanced Spinel Ferrite Nanocomposites for Electromagnetic Application

Epoxy-based (EP)-Cobalt Ferrite nanocomposites is useful as protective coatings and corrosion-resistant for a variety of application.[41] The cobalt ferrite nanofiller was synthesized through a coprecipitation route by a reaction of $Fe_2(SO_4)_3$, Co $SO_4$, and triethylene glycol. The obtained cobalt ferrite NPs were thermally treated at 600°C for 5 hours. As prepared, the cobalt ferrite NPs were surface functionalized with 3-(triethoxysilyl) propylalamine (APTES).[41] Yadav, 2021, reported spinel ferrite nanocomposites formation and characterization. An advanced spinel ferrite nanocomposites for electromagnetic applications were reported.[42] Multifunctional magnetic nanoparticle has been reported by Aghanejad 2021, for medical application-based hybrid materials.[43]

One of the delivery patterns for CRISPR/Cas9 system is non-viral delivery modes, incl. transfection using polymer nanoparticles, once using gold nanoparticles for gene therapy.[11]

**(A) Kelor Leaves Soup with Coconut Water**

**B) Kelor Leaves Soup with Coconut Milk (Santan)**

**FIGURE 1: From Kelor Leaves Soup to Source of Green Synthesis Semiconductors Magnetic NPs**

## V. LIMITATION

Magnetic nanoparticles (NPs), such as Ferromagnetic cobalt ferrite (CoF) are suitable for transfection in NG drug delivery,[45] Cobalt ferrite synthesized by co-precipitation method, agarose gel, and deionized water were used during the test, superparamagnetic with an average stable small size of 10.45 nm.[45]Smaller than 7 nm could not positivity affect the higher $r_2$ relaxivity.[45] Many magnetic NPs recklessly think as diamagnetic (nonmagnetic), not Ferromagnetic is a stuff that could be pulled strongly by magnets: cobalt, iron, steel, and nickel. Diamagnetic materials are those that some people generally think of as nonmagnetic, such as gold, copper, mercury, and bismuth. Paramagnetic materials are those that have weak pull by magnets, e.g.: aluminum, copper, and platinum. But, superparamagnetic is a form of magnetism that appears in small ferromagnetic or ferromagnetic nanoparticles, where due to the small size, flip direction under the influence of different temperatures, pH, and longer time of process, have higher magnetic characteristics.[45,46] A single-domain magnetic iron oxide particles with hydrodynamic diameters ranging from 1->100 nm are called Superparamagnetic Iron Oxide Nanoparticles (SPIONs).[45,46] This review does not strictly group the size of NPs in biological applications, especially RNAi vectors, the role of methods, and PH. We are sometimes trapped to dig the NPs for induction of hyperthermia, also as a contrast agent in MRI,[46] and water treatment in degradation of organic dyes[17].

## VI. CONCLUSION

Semiconductor $CoFe_2O_4$ extracted from many leaves from the tropical rainforest area, act as a nano-carrier transposon bullet in the transfection process in wet and warm tropical rainforest countries, are signed by mantids. Improving the performance of the Nano Ferrite Indigenous Vector in various places, and various parts of plants will develop the knowledge for prospects to further enrichments.

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## CONFLICT OF INTEREST

The author declares no conflict of interest.

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