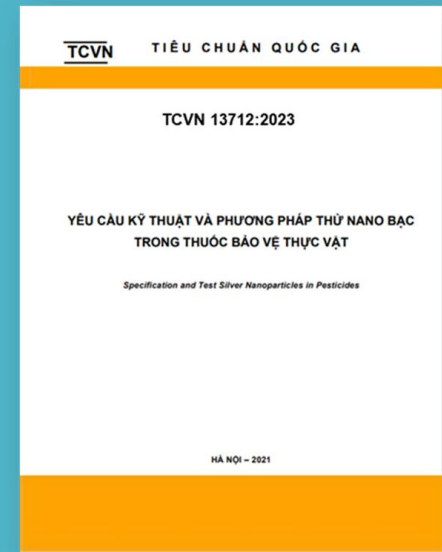
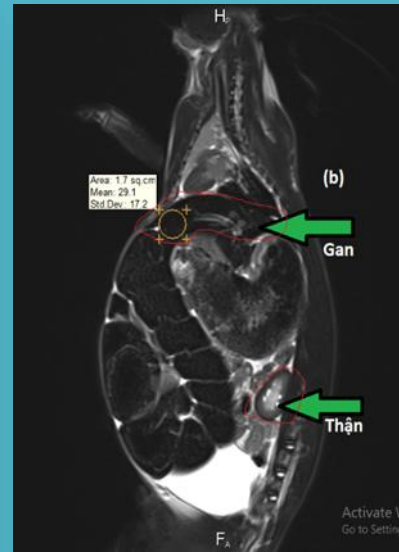


# NANOPRODUCTS DEFINITION, SAFETY, AND INNOVATION IN VIETNAM: R&D AND MARKET TRENDS



Mar. 28, 2025  
Bangkok, Thailand  
(Webinar talk)

Quang Le Dang, Tran Dai Lam

Institute of Materials Science, Vietnam Academy of  
Science and Technology

# RECENT REGISTERED NANO PRODUCTS USED AS SUPPLEMENTS IN CANCER TREATMENT

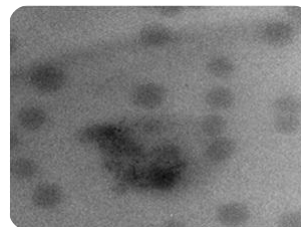
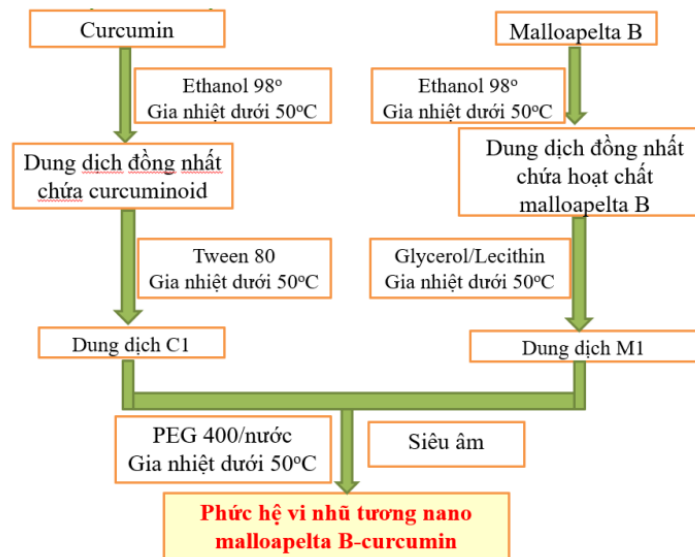
## PRODUCT OF NANO MALLOAPELTA B-CURCUMIN FOR CANCER TREATMENT (2019-2025)



Phép thử độc tính bất thường trên chuột



Khu chăn nuôi súc vật thí nghiệm



# RECENT REGISTERED NANO PRODUCTS USED AS SUPPLEMENTS IN CANCER TREATMENT

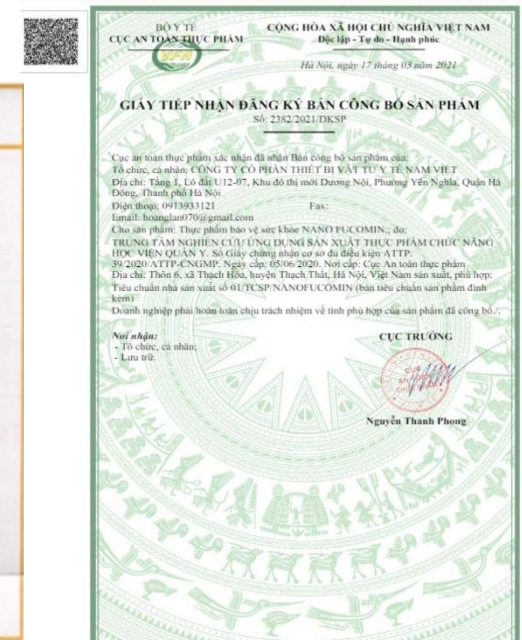




# Nano Fucomin HVQY



THÀNH PHẦN:	
Cao hỗn hợp 100mg tương đương với:	
Bèo hoa dâu	200mg
Xạ đen	200mg
Bạch hoa xà thiệt thảo	200mg
Bán chỉ liên	200mg
Trinh nữ hoàng cung	200mg
Fucoidan	200mg
Nano curcumin (HL curcumin 10%)	150mg
Bột Tam thất	30mg
Selen 2.000ppm	5mg
Piperine	0,5mg
Phụ liệu: talc, magie stearat vừa đủ 1 viên.	



- ❖ Registration number: 2382/2021/ĐKSP
- ❖ The price of one box (30 capsules) of Nano Fucomin is approximately 13.83 USD.
- ❖ Use for:  
Cancer treatment support; Cancer risk reduction; Immune system boost; Antioxidant and cell protection; Digestive health.

# Nano Cordyceps



Product Declaration – Advertising Permit – FDA Approval Certificate

- ❖ **Registration number: 11927/2020/ĐKSP**
- ❖ The price of a box containing 2 bottles (60 tablets) is approximately 37,31 USD
- ❖ Use for:  
People with weakened bodies and low immunity. Individuals who need to nourish their bodies and support liver, kidney, and lung functions.

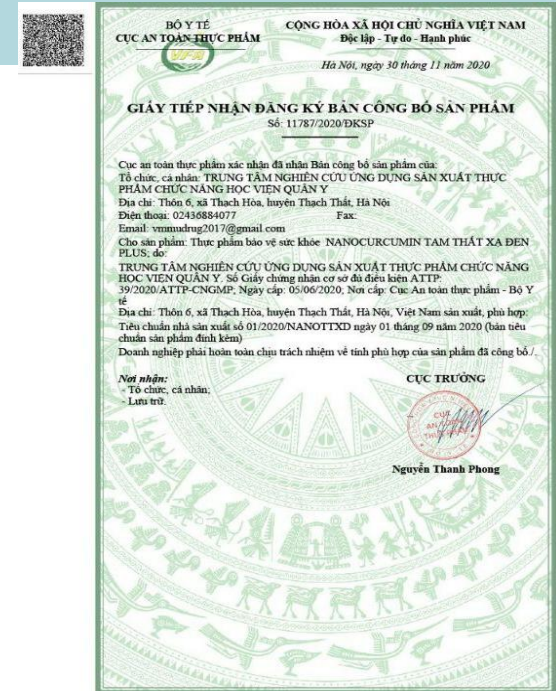
THÀNH PHẦN:	
Nano Đông Trùng Hạ Thảo (Nano Cordyceps Militaris)	800mg
L-Arginine HCl	600mg
Cao Xuân Tiết (Adhatoda Vasica Nees Extract)	240mg
Kẽm Gluconat (Zn Gluconate)	120mg
Cao Hồng Sâm (Red Ginseng Extract)	80mg
Phụ liệu: Starch, Polyvinylpyrrolidon(1201), talc(553(iii)), magie stearate vừa đủ bốn viên nang cứng.	



# Nano Curcumin, panax pseudoginseng and black Gynostemma



THÀNH PHẦN	
Nano curcumin (curcumin 10%)...	300mg
Cao tam thất .....	50mg
Cao xạ đen .....	50mg
Cao quả nhàu .....	40mg
Chiết xuất tảo nâu .....	20mg
Collagen peptide .....	20mg
Vitamin E .....	6 IU
Bioperine .....	0,5mg
Phụ liệu: talc, magnesi stearat, vỏ nang gelatin vừa đủ 1 viên	



- ❖ Registration number:11787/2020/ĐKSP
- ❖ The price of one box (3 blisters - 10 capsules) is approximately 13.28 USD.
- ❖ Use for:  
People with symptoms such as belching, heartburn, bloating, indigestion, and epigastric pain due to gastric and duodenal ulcers. People who drink alcohol or take medications that increase the risk of gastric and duodenal ulcers.

# Purple Morinda Root (Ba Kich) of Quang Ninh.



❖ Anthraquinones, Iridoids, Oligo-polysaccharides from Purple Morinda Root (Ba Kich)

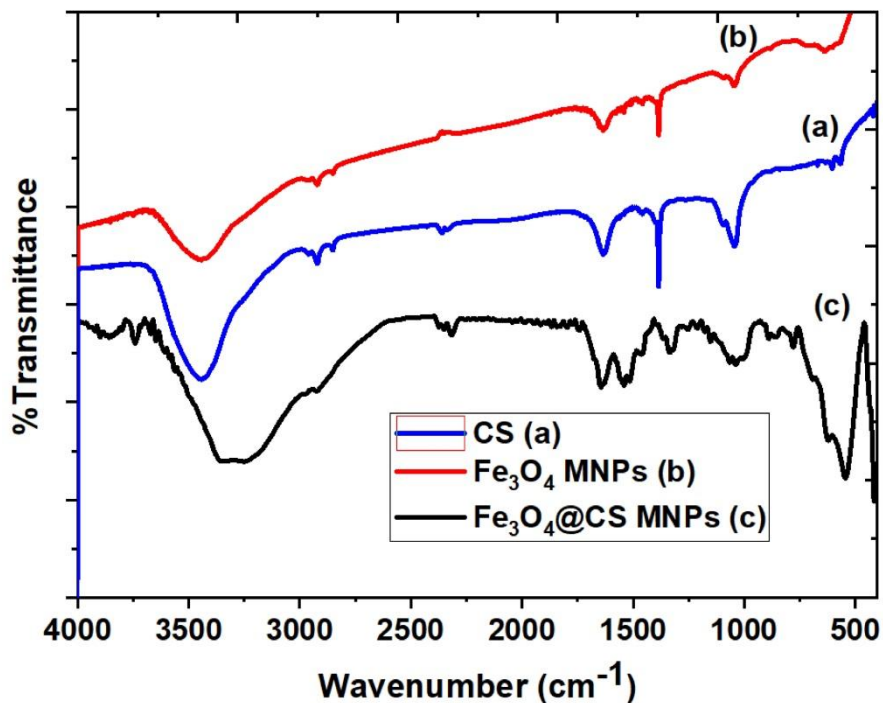
❖ Use for:

People at risk of osteoporosis, the elderly, or those with bone and joint issues

- ❖ The functional food product from Quang Ninh Purple Ba Kich is developed using nano technology, optimizing treatment efficiency and ensuring safety for users.
- ❖ The nano Ba Kich raw material production process has been completed on a scale of 5 kg/batch.
- ❖ This technology has been successfully transferred to CVI Pharmaceuticals and Cosmetics Joint Stock Company.



# NANO CHITOSAN-COATED $\text{Fe}_3\text{O}_4$ ( $\text{Fe}_3\text{O}_4@\text{CS}$ )

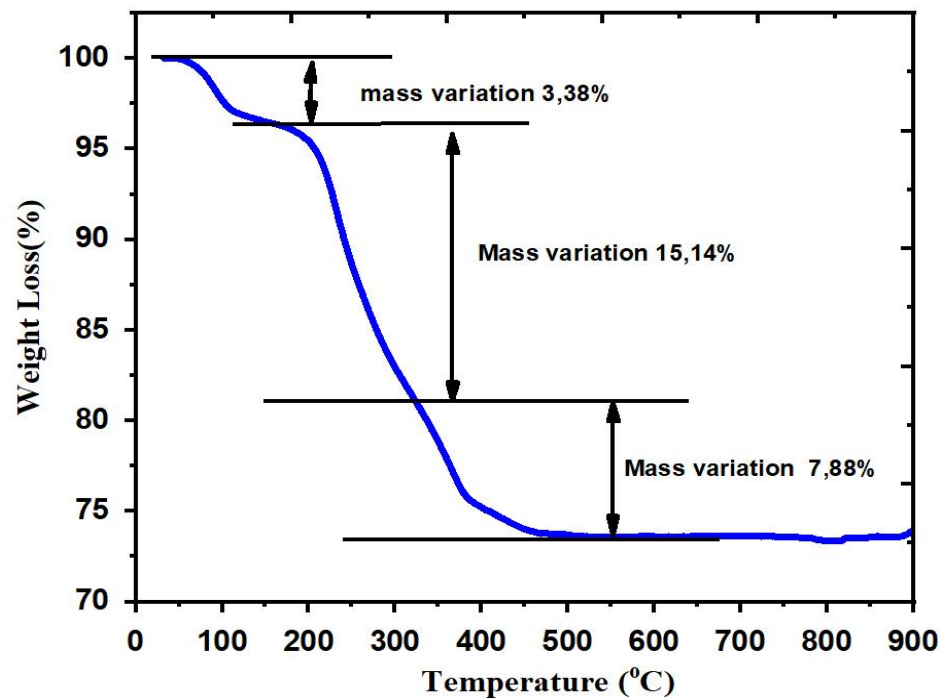


FTIR spectra of Chitosan (CS),  $\text{Fe}_3\text{O}_4$  and  $\text{Fe}_3\text{O}_4@\text{CS}$

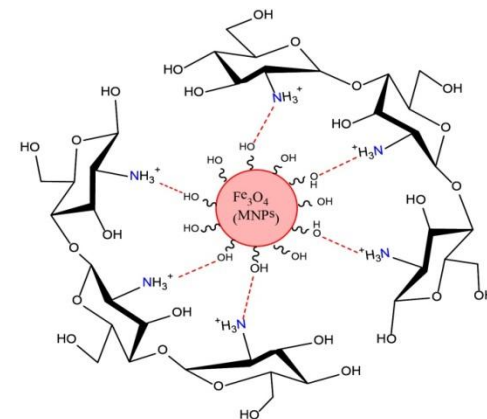


✓ FT-IR, TGA: coating with polime CS

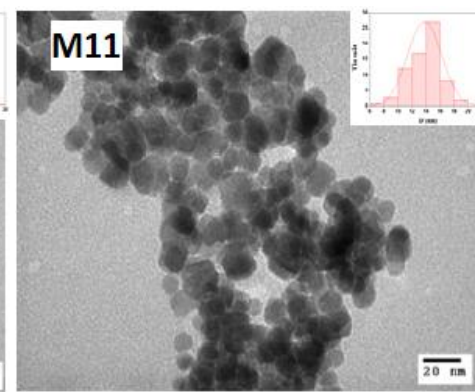
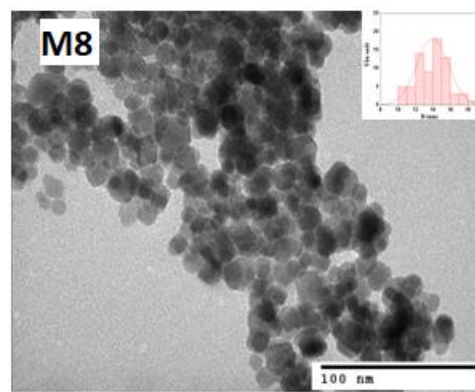
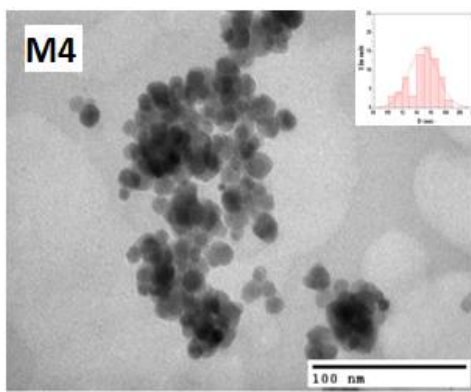
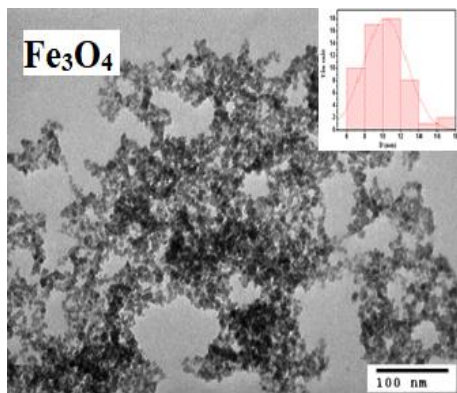
Magnetic fluid



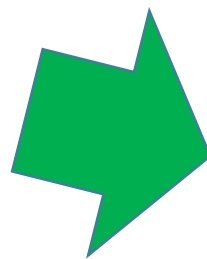
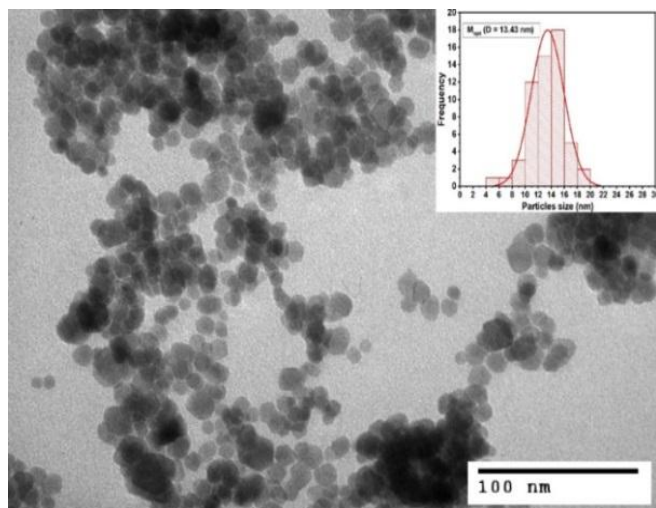
TGA của mẫu  $\text{Fe}_3\text{O}_4@\text{CS}$







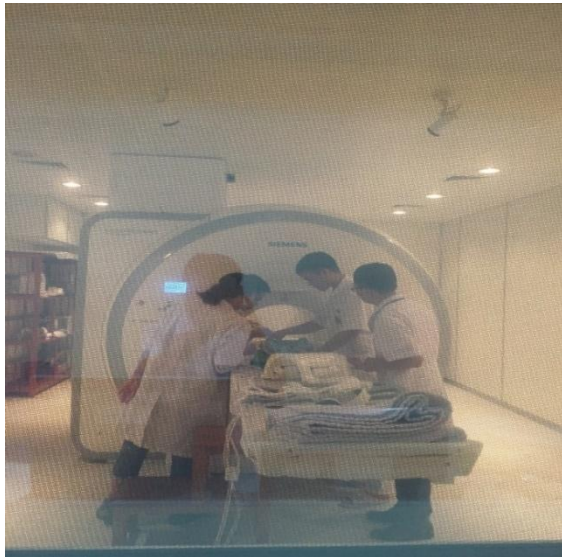
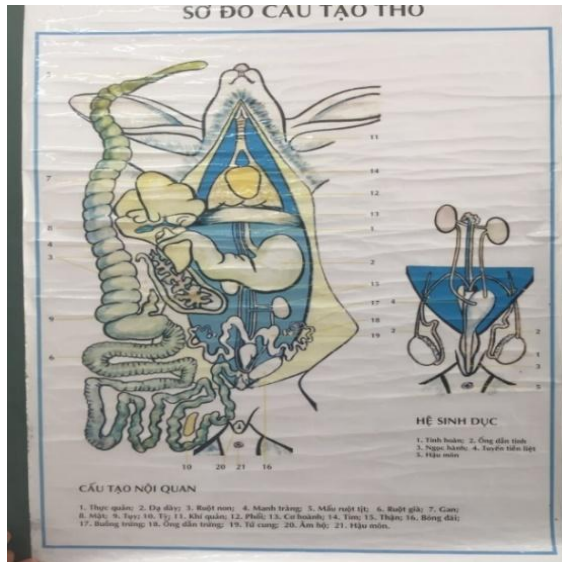
*TEM of  $Fe_3O_4@CS$*



**Các hạt thu được có dạng hình cầu, các mẫu thu được có kích thước 12-18 nm, các hạt không ở dạng đơn phân tán**

*TEM of  $Fe_3O_4@CS$  from optimal reaction with  $Fe^{3+}$  0,21M; Temp. 165°C; for 2 h 55 min by hydrothermal method*

# IN VIVO TEST OF MAGNETIC FLUIDS BY MRI IN RABBIT



*Hình ảnh thỏ trước và sau khi được đưa vào máy chụp MRI*



# APPLICATION OF NANO SILVER AS AGROCHEMICALS IN VIETNAM

## AND PLANNING THE NATIONAL STANDARD FOR AgNP



Hình 1. Kiểm tra độ chín và thu hoạch quýt Hương Cẩn



Hình 2. Quýt Hương Cẩn được phân loại và phân lô thí nghiệm



Hình 3. Quýt Hương Cẩn được phân lô thí nghiệm



# PLANT PROTECTION DEPARTMENT OF VIETNAM

REQUIREMENT TO DETERMINE THE  
QUALITY AND SAFETY OF PESTICIDES  
CONTAINING NANOSILVER



## Register Nano SILVER pesticides in Vietnam

TT	TÊN HOẠT CHẤT – NGUYÊN LIỆU (COMMON NAME)	TÊN THƯƠNG PHẨM (TRADE NAME)	ĐỐI TƯỢNG PHÒNG TRỪ (CROP/PEST)	TỔ CHỨC ĐỀ NGHỊ ĐĂNG KÝ (APPLICANT)
1.	Nano Ag 1g/l + Chitosan 25g/l	Nano Kito 2.6SL	Nấm hồng/ cao su	Công ty TNHH Ngân Anh
1.	Chitosan tan 0.5% + nano Ag 0.1%	Mifum 0.6SL	đạo ôn, lem lép hạt/ lúa	Viện Khoa học vật liệu ứng dụng

# THE REGISTERED PESTICIDES CONTAINING NANOSILVER THAT ALLOWED USING IN VIETNAM

## INVESTIGATION OF 10 AGRICULTURAL PRODUCTS CONTAINING AgNP IN VIETNAM



2nd Nông Nghiệp ĐEP  
Nông Nghiệp ĐEP.com



**KẾT QUẢ NGHIÊN CỨU KHÁNG BỆNH CỦA BẠC NANO/CHITOSAN TRÊN CÂY CỎ MÙI VÀ RAU MÀU**

BỆNH CÂY TRỒNG	LIỀU LƯỢNG HIỆU QUẢ
Vàng lá thời rế, greening (cây có múi)	50 - 75 ml/16 lít
Thối nhũn, thán thư (rau ăn lá, quả, củ)	50 ml/16 lít
Thối rế, xỉ mù, thối bông (cây ăn trái)	50 ml/16 lít
Thối bông, gỉ sắt (hoa cúc)	50 - 75 ml/16 lít

*GHI CHÚ: Từ 7 - 10 ngày phun 1 lần trong mùa mưa  
(Nguồn: Viện Khoa học Vật liệu Ứng dụng)*





**Sản phẩm của:**  
**VIỆN HÀN LÂM KHOA HỌC VÀ CÔNG NGHỆ VIỆT NAM**  
**VIỆN KHOA HỌC VẬT LIỆU ỨNG DỤNG**

Địa chỉ: 01 Mạc Đĩnh Chi, Quận 1, Tp. Hồ Chí Minh  
ĐT/Fax: (028) 3891 9992    SDK: 5744/CNKG-BVTV  
TCCS: 07/2012/VIAMS

CÂN THÂN  
**THUỐC TRỪ BỆNH CÂY TRỒNG**  
**MIFUM 0.6SL**  
**NANO THỀ HỆ THỨ 3**

**CÔNG NGHỆ NANO**  
**THẨM SÂU, TIÊU DIỆT NHANH**  
**NHIỀU LOẠI NẤM BỆNH.**

**HƯỚNG DẪN SỬ DỤNG**

CÂY TRỒNG	ĐỐI TƯỢNG PHÒNG TRỪ	LIỀU LƯỢNG SỬ DỤNG	CÁCH DÙNG
Lúa	Bệnh đạo ôn	25 ml/16 L	Phun sau sạ 10 - 15 ngày
	Bệnh lem lép hạt	50 ml/16 L	Phun khi vết bệnh mới xuất hiện
	Bệnh lem lép hạt	50 ml/16 L	Phun sau khi trời tạnh mưa Phun 2 lần, cách nhau 7 ngày

Thành phần:

Nano Ag.....0.1% (w/v)  
Chitosan tan.....0.5% (w/v)  
Phụ gia: Chất sinh học chứa Cu, Zn, B,  
Vitamin B12 và nước đủ 100%

**Cu + Ag → Cu-Ag**

Thể tích thực  
**500 ml**

**TẮY TRÁI, SÁNG TRÁI**

**KẾT QUẢ NGHIÊN CỨU KHÁNG BỆNH CỦA BẠC NANO/CHITOSAN TRÊN CÂY THANH LONG**

BỆNH THANH LONG	LIỀU LƯỢNG HIỆU QUẢ
Đốm nâu	50 - 75 ml/16 lít
Vàng đầu trụ	50 ml/16 lít
Giữ trái tươi lâu	1 chai/20 lít

*GHI CHÚ: Từ 7 - 10 ngày phun 1 lần trong mùa mưa  
(Nguồn: Viện Khoa học Vật liệu Ứng dụng)*





**CẢNH BÁO AN TOÀN:**

- Bảo quản nơi khô ráo và thoáng mát.
- Để xa tầm tay, tránh tiếp xúc với trẻ em.
- Rửa sạch tay sau khi sử dụng.

**HSD: 3 năm**  
**NSX:**

**SẢN PHẨM ĐẶC HIỆU TRỪ NẤM BỆNH BẰNG CÔNG NGHỆ NANO**

# STANDARDIZATION ACTIVITIES



## ASIAN NANO FORUM - ANF



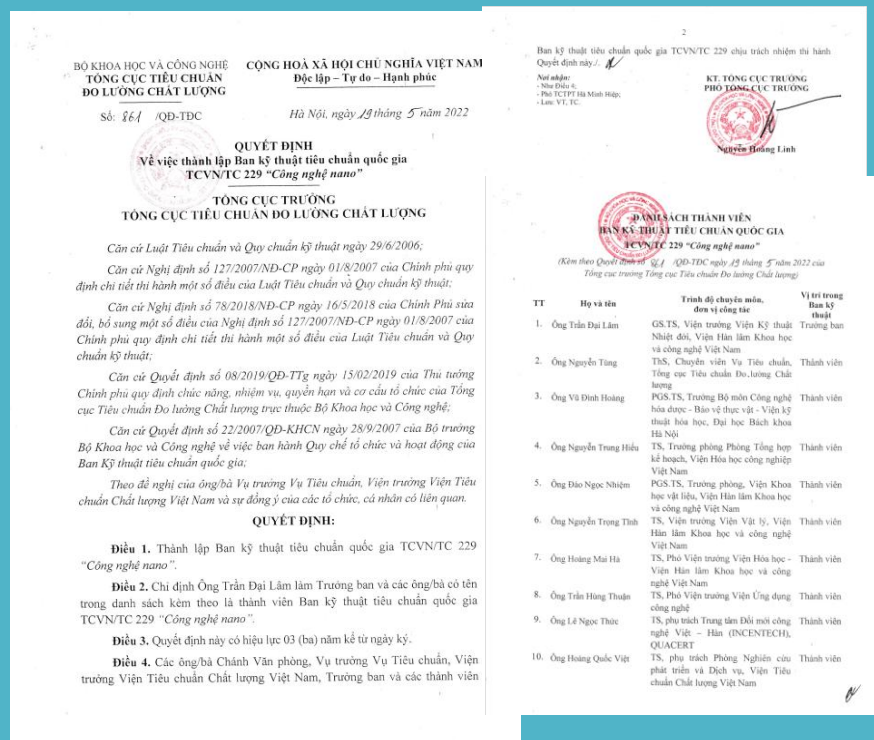
The national standard for pesticides containing nano silver have published in Decision No. 1743/QĐ-BKHCN dated August 11, 2023:

1)TCVN 13712:2023 Thuốc bảo vệ thực vật – Xác định hàm lượng nano bạc bằng phương pháp phổ hấp thụ nguyên nguyên tử

Pesticides - Determination of silver nanoparticle content by atomic absorption spectrometry method

Reference: <https://tieuchuan.vsqi.gov.vn/tieuchuan/view?sohieu=TCVN+13712%3A2023>

## Vietnam National Standards Technical Committee on Nanotechnology TCVN/TC 229 (Established 5/19/2022)





Released TCVN 13712:2023

**TCVN**

**TIÊU CHUẨN QUỐC GIA**

**TCVN 11296:2015**

Xuất bản lần 1

**NANOCURCUMIN**

*Nanocurcumin*

Determination of total  
curcumins in the sample  
matrix

**HÀ NỘI - 2016**



**TCVN**

**TIÊU CHUẨN QUỐC GIA**

**TCVN 13712:2023**

**YÊU CẦU KỸ THUẬT VÀ PHƯƠNG PHÁP THỬ NANO BẠC  
TRONG THUỐC BẢO VỆ THỰC VẬT**

*Specification and Test Silver Nanoparticles in Pesticides*

Determination of AgNP  
content and Ag<sup>+</sup> content

**HÀ NỘI - 2021**

## 05 Vietnam National Standards (TCVN) published in 2023:

1. TCVN 13870:2023 (ISO/TR 13121:2011) *Nanotechnologies — Nanomaterial risk evaluation*
2. TCVN 13871:2023 (ISO 17200:2020) *Nanotechnology — Nanoparticles in powder form — Characteristics and measurements*
3. TCVN 13872:2023 (ISO 19749:2021) *Nanotechnologies — Measurements of particle size and shape distributions by scanning electron microscopy*
4. TCVN 13873:2033 (ISO/TS 19808:2020) *Nanotechnologies — Carbon nanotube suspensions — Specification of characteristics and measurement methods*
5. TCVN 13874:2023 (ISO 21363:2020) *Nanotechnologies — Measurements of particle size and shape distributions by transmission electron microscopy*

# 05 VIETNAM NATIONAL STANDARDS (TCVN) UNDER EVALUATION ACCORDING TO THE 2024 PLAN, EXPECTED TO BE ANNOUNCED IN 2025

- *Nanotechnologies — Antibacterial silver nanoparticles — Specification of characteristics and measurement methods*  
(New standard development, adoption of ISO/TS 20660:2019)
- *Nanotechnologies — Determination of silver nanoparticles potency by release of uramic acid from Staphylococcus aureus*  
(New standard development, adoption of ISO/TS 16550:2014)
- *Nanotechnologies — Polymeric nanocomposite films for food packaging with barrier properties — Specification of characteristics and measurement methods*  
(New standard development, adoption of ISO/TS 21975:2020)
- *Evaluation of methods for assessing the release of nanomaterials from commercial, nanomaterial-containing polymer composites*  
(New standard development, adoption of ISO/TS 22293:2021)
- *Nanotechnologies — Vocabulary — Part 1: Core vocabulary*  
(New standard development, adoption of ISO/TS 80004-1:2023)



# Plan of preparation of 04 Vietnam National Standards in 2025-2026

- *Nanotechnologies — Magnetic nanomaterials Part 1: Specification of characteristics and measurements for magnetic nanosuspensions*

(New standard development, adoption of ISO/TS 19807-1:2019)

- *Nanotechnologies - Magnetic nanomaterials - Part 2: Specification of characteristics and measurement methods for nanostructured magnetic beads for nucleic acid extraction*

(New standard development, adoption of ISO/TS 19807-2:2021)

- *Nanotechnologies - Clay nanomaterials - Part 1: Specification of characteristics and measurement methods for layered clay nanomaterials*

(New standard development, adoption of ISO/TS 21236-1:2019)

- *Nanotechnologies — Clay nanomaterials Part 2: Specification of characteristics and measurements for clay nanoplates used for gas-barrier film applications*

(New standard development, adoption of ISO/TS 21236-2:2021)



**RESPONSIBLE CARE®**  
OUR COMMITMENT TO SUSTAINABILITY



# 2018

## RESPONSIBLE CARE® STATUS REPORT

### The Global Picture



third-party RCMS audits conducted by independent, accredited auditing firms on regular basis. Similar to ISO audits, the company is required to demonstrate conformance to the management system's requirements at headquarters and a sample of its facilities. Companies report their status to ACC and are encouraged to share audit results with relevant stakeholders. Companies failing to obtain their required certifications are subject to ACC's governance process.

■ ACC extends the RC ethic and management practices throughout the entire chemical supply chain through its Partnership Program.

■ Partners adhere to the same RC requirements as ACC members; their CEOs make a commitment to uphold the following RC program elements: Endorsing the Responsible Care Guiding Principles ■ Measuring and publicly reporting performance on an annual basis ■ Implementing the RC Product Safety Code, Process Safety Code and Security Code within a firm time frame ■ Implementing the RCMS to achieve and verify results ■ Obtaining independent certification that a management system is in place and functions according to professional specifications.

■ RC is industry's commitment to using and managing those materials with an essential role in thousands of products and technologies in everyday use both safely and responsibly. While more than a dozen federal laws regulate the safe use of chemicals, RC means that ACC members go above and beyond these requirements. Under the Product Safety Code, ACC member companies must adhere to a comprehensive set of practices and procedures to safely manage the products they manufacture.

■ As well as the website listed above, the following sites offer further detailed information about ACC's sustainability efforts and other RC-related initiatives reflecting the commitment to communicate openly with stakeholders.

[www.americanchemistry.com/Sustainability/Principles.html](http://www.americanchemistry.com/Sustainability/Principles.html)

[www.chemicalsafetyfacts.org/](http://www.chemicalsafetyfacts.org/)

[www.sciencetobehindustainability.org/](http://www.sciencetobehindustainability.org/)

## URUGUAY

### ASIQR

Asociación de Industrias Químicas del Uruguay

Avda. Italia 6101, C.P. 11500 Montevideo

■ Milton Vázquez

[asiqurcr@ciuc.com.uy](mailto:asiqurcr@ciuc.com.uy) / [asiqurcr@gmail.com](mailto:asiqurcr@gmail.com)

[www.asiqr.org](http://www.asiqr.org)

### FACTFILE

Adopted Responsible Care in 1998

■ RC = Mandatory

MEMBERSHIP / RESPONSIBLE CARE COMPANIES: 37 sales ~US\$556mn

■ A new formal RC commitment was signed in 2016 by all members. The concept of sustainable development is included in the RC program.

■ Primary form of implementation are the CoPs; requirements of the RC program are established in the codes and each code includes explanation to help members with understanding and implementation.

✓ Independent verification of company RC program carried out and certification provided.

① Senior company managers meet annually with ASIQR to discuss priority issues with RC topics given special consideration.

ASIQR cooperates closely with technical personnel of government ministries enabling constructive discussion of EH&S. Performance improvement achieved in OH&S by the chemical sector won first place in the 3M Occupational Safety 2016 award scheme.

■ RC companies carry out audits of customers and suppliers. ICCA product stewardship guidance discussed with members. GPS product stewardship elements are being implemented as part of RC. Three GHS courses were carried out between 2010 and 2014 with participants from both member companies and the Ministries of Work, Health, and Fire Departments.

## V

## VENEZUELA

### ASOQUIM

Asociación Venezolana de la Industria Química y Petroquímica  
Av. Francisco Solano López con 3era.

Av. Las Delicias

Edif. Centro Solano, Piso 1, Ofc. 1-A, Chacaito, Caracas ZP 1050

■ Geraldina Palm de Pulido

[gpulido@asoquim.com](mailto:gpulido@asoquim.com) / [responsabilidadintegralasoquim.com](http://responsabilidadintegralasoquim.com)

[www.asoquim.com](http://www.asoquim.com)

### FACTFILE

Adopted Responsible Care in 2002

MEMBERSHIP: 140 + 82 Partners

RESPONSIBLE CARE COMPANIES: 19

■ Guiding Principles are published on ASOQUIM website and full set of CoPs implemented through management system specification.

■ 2016 KPI data reported by 7 RC companies.

✓ Performance is externally verified.

① CEO commitment to RC is renewed every 3 years or sooner if personnel change. ASOQUIM coordinates the activities of the RI (Responsibilidad Integral) Mutual Assistance Committee (CAMRI) of companies adhering to the program. Since 2012 ASOQUIM has given a Commitment Award to the company that demonstrates greatest commitment to RC activities and a Performance Award to the company demonstrating best performance.

① In 2012 ASOQUIM developed an Information System for Emergency Response (SIRE).

■ The association is working with national government regarding adoption of the UN GHS.

## VIETNAM

### VRCC

Vietnam Responsible Care Council

Chemical Society of Vietnam

Hoi Hoa hoc Vietnam (CSV) 50 2, Pham Ngu Lao, Hanoi

■ Do Thanh Bai

[baidotanh@gmail.com](mailto:baidotanh@gmail.com) / [phidoduy1948@gmail.com](mailto:phidoduy1948@gmail.com)

[www.vrcc.com.vn](http://www.vrcc.com.vn)

### FACTFILE

Adopted Responsible Care in 2015

MEMBERSHIP / RESPONSIBLE CARE COMPANIES: 45

① Since VRCC was established in 2012, membership has grown from 30 to 45 members. 26 training courses have been held, of which 17 took place between 2016-18. Dialogue sessions between VRCC and government agencies have been held on 12 occasions since 2015.





**Responsible Care®**  
Good Chemistry at Work



## Asia-Pacific Responsible Care® Organization (APRO) Meeting

Admin July 5, 2016 Featured News, RC News



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## BENEFITS FROM PARTICIPATION IN OECD'S WORK ON CHEMICALS

- ✓ Implementing and strengthening an **industrial chemical management system**
- ✓ Influence the development of tools for the implementation of **safety policies** on chemical management.
- ✓ **Access** to internationally agreed standards for EHS
- ✓ **Reduce** the risk from chemicals & barrier to trade and **Avoid** duplicative testing
- ✓ Flexible programme to address **emerging issues**
- ✓ **Dissemination of products** and increased use beyond OECD member countries







THANK YOU FOR YOUR ATTENTION



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OUR COMMITMENT TO SUSTAINABILITY