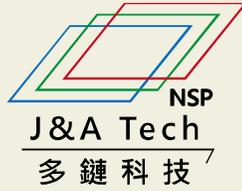




國立中興大學
National Chung Hsing University



NSP for Life !



nano silicate platelets (NSP)

* from natural clays of nontoxic silicates



NSP “physical mechanism” enabling “quorum quenching”

bacteria and virus --

- Agriculture, Livestock and Environmental restoration

NSP Inventor

Prof JJ Lin

(jiangjenlin@gmail.com)

National Taiwan University
2005 ~ 2018

National Chung Hsin University
1995 ~ 2005

- Emeritus Professor, National Taiwan University
- Guest Professor, National Chung-Hsing University
- Founder, J&A Technology **2018**

Experience

- Professor of NTU and NCHU, **1995-2018**
- Texaco Chemical Co. and Shell Development Co. **1979-1995**

Education

- BS, NTU, Agricultural Chemistry **1969**
- MS, NTU, Chemistry **1972**
- PhD, Georgia Institute of Technology, Chemistry **1977**
- Postdoctoral, Cornell U and Princeton U **1977-1979**

Publication

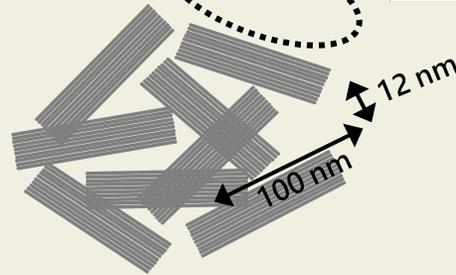
- Academic articles **234**
- **US Patents 155 ; Taiwan Patents 72**

NSP Invention -- Serendipity strikes on the prepared mind !

Conventional Clay Uses -- Nanocomposites for automobile parts 1985 by Toyota

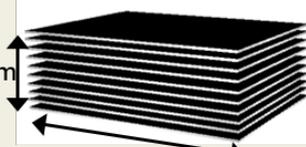


Natural Clays



Form of Aggregates

A primary unit of Na⁺-MMT
CEC: 120 meq./100 g

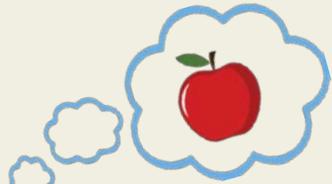


DuPont Nylon plastics (our new invention in 2022)



1985 by Toyota

NSP Invention -- new composition of silicate nano-platelets for Anti-bacterial uses in 2003-2009



Clays



NSP For Life!

In water

In powder



Agriculture 2018



Livestock 2022



Academic Findings: NSP natural antibacterial agent for a broad spectrum of bacteria by physical capturing mechanism (not a chemical pathway) and low toxicity to human cells



JJ Lin et.al. *Journal of Physical Chemistry C* (2011) 115, 18770.

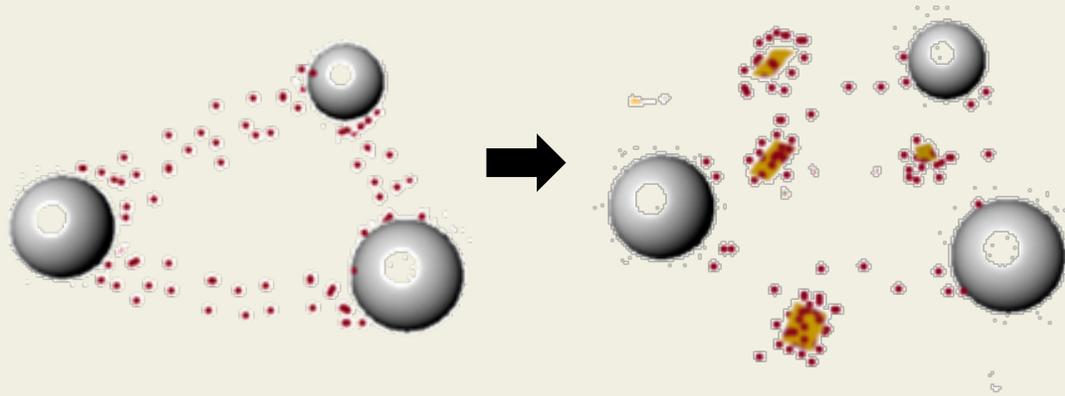
- NSP adhere onto bacteria surface and cause cell death/atrophy.
- Antibacterial effect for Gram (-) and (+) bacteria: *E. coli*, *P. aeruginosa*, *S. aureus*, and *S. pyogenes*....and MRSA
- *NSP enabling "Quorum Quenching Functions by Physical Mecahnism"*



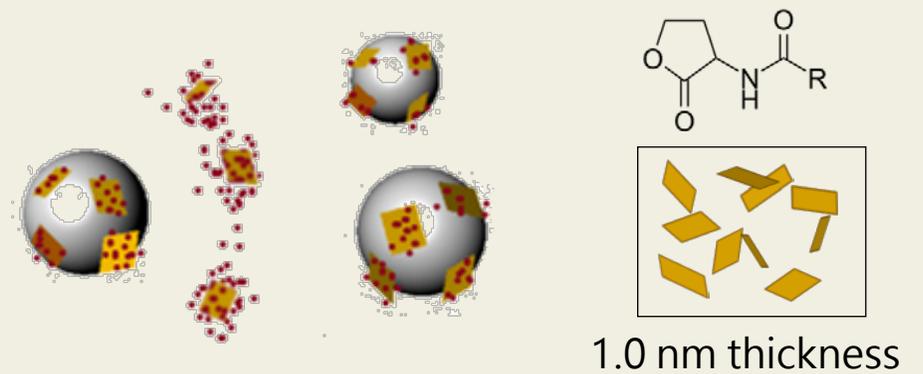
Antibacterial by "Physical Capturing" and "Quorum Quenching" or "blocking cross-talking"

(JJ Lin, Journal of Physical Chemistry C, 2011)

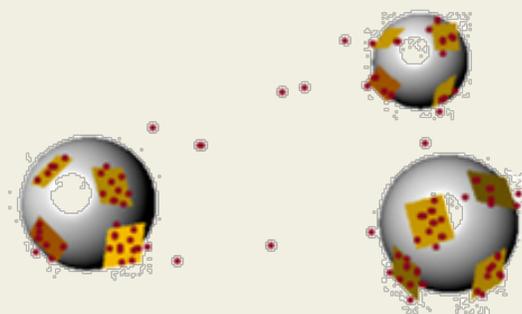
Normal Behavior of Bacterial Quorum Sensing
by sending molecular signals



NSP step 1
Intercepting the signals



NSP step 2
physically **adhering** on cell surface



NSP step 3
rupturing and **aggregating** the cells



What is NSP?

- the hidden treasure in sand–
- NSP friendly join the equilibrium of the Nature–
JJ Lin

Since 2000, we have been interested in the research of polymer nanomaterials involving the exfoliation of the natural clays to make nanoscale of silicate platelets. By serendipity, we discovered a new method of converting the natural clays to new composition matter of "nanoscale silicate platelets, NSP", and been awarded with Taiwanese and US patents. By collaborating with several professors of diversified expertise, we developed a host of new applications shown below:

- ◆ Agriculture: "zero-pesticide" and organic farming, promoting plant growth, soil restoration from acidification, increasing Si-fertilizer and bioavailability
- ◆ Livestock: replacing antibiotics, removing toxins, anti-virus and suppressing bird
- ◆ Water treatment and lake eutrophication: improving water quality by adsorbing organic toxins, pollutants and pathogenic bacteria
- ◆ Medical uses: antimicrobial and anti-virus by "physical" mechanism



NSP working principle

1) NSP are made from natural clay through "nanoscale dispersion technology" in 2001-3 and awarded by 16 patents, claiming the processes of making it and the "new composition matter".

2) NSP properties and functions :

2a. "Physical Adsorption Forces" —NSP of 750 square meters per gram, has high surface energy and anionic charge attraction forces, rendering the functions of capturing microorganisms and inhibiting their growth, and "absorbing" toxins, heavy metals, ammonia and sulfur compounds, deodorizing, etc.

2b. "Non-toxic"—NSP is non-toxic material and causing none of drug resistance, suitable for poultry farming and controlling the balance of microbial colonies

2c. "Long-term stability"--being stable silicates (not organic chemical) and well dispersible in water, NSP behave to "friendly join the equilibrium of the Nature".

NSP can play multiple roles, including physically inhibiting pathogenic bacteria, viruses, ammonia removal, etc.



The Diversity of NSP Applications

"Zero-Pesticide" Agricultures

"Zero-Antibiotics" Livestock and Anti-virus (bird flu)

Soil/Water Environmental Restoration

1. "Zero-Pesticide" Agriculture: Free of chemical pesticides, Organic Toxins, Inorganic Heavy Metals, organic-farming agriculture
2. Soil Restoration (reducing fertilizer uses and improving soil fertility by buffer acidity)
3. Crop Protection from Diseases, Insects, Bacteria, Virus, Fungi, etc.
4. Plant Growth Promoter (non-chemical method) – improving bioavailability (nutrition uptake from soil), photosynthesis, Si-fertilizer, and water-keeping)
5. Seed Protection
6. Deodorizing in environment and air pollution
7. "Zero-Antibiotics": Free of Antibiotics/Chemical Drugs in Poultry and Aquaculture/Fish/Shrimp Farming, Gaseous ammonia adsorption in poultry farms
8. Anti-virus (Anti-Bird Flu of chicken farm)



**THANK
YOU**

NSP can help !
