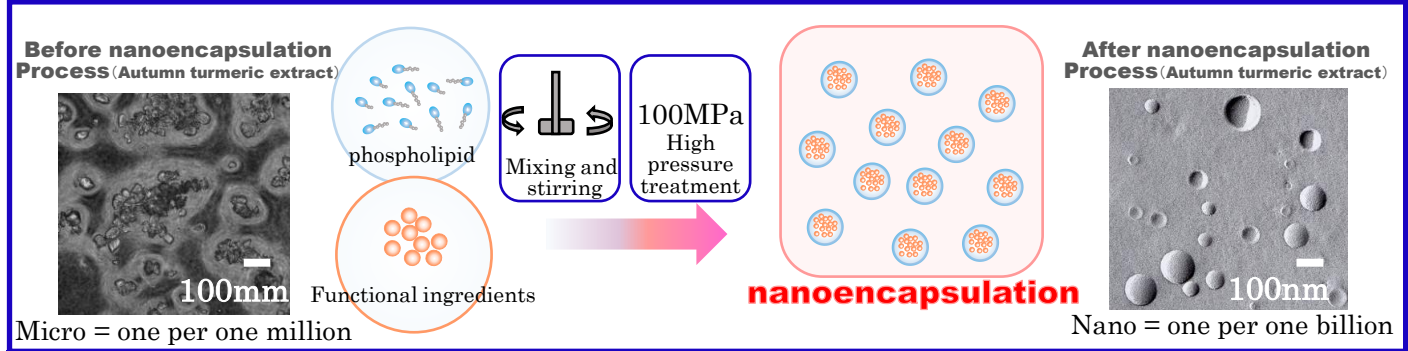


# ~ Nanoencapsulation of Functional Ingredients ~

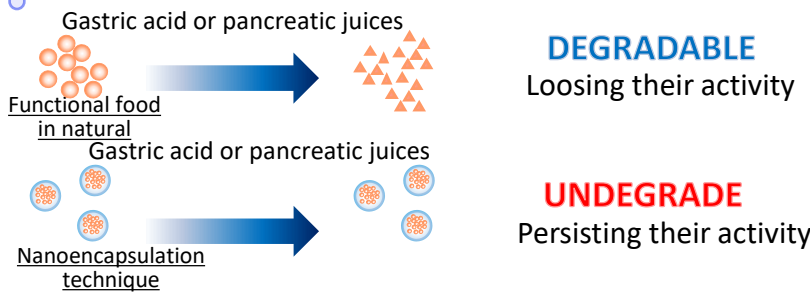
Applying “nano technology” attracted among various fields, **Kanehide Bio succeed in nano encapsulating of food ingredients** by joint research with the national institute of advanced industrial science and technology(AIST). By this technique may offer innovation in the macroscale characteristics of active ingredients, such as taste, flavor, other sensory attributes and bioavailability.

- For applying to the food field
- Using inexpensive material (phospholipid)
  - Not using organic solvents
  - Excellent technique in operability and producibility

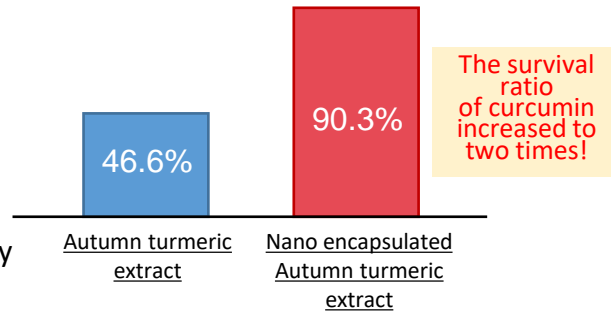


**OBTAINING PATENT ! PATENT No.3858073 and 4634886**

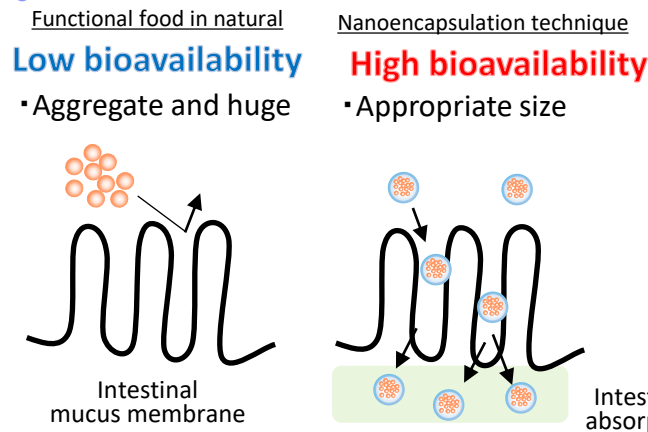
## Protection of active ingredient against digestive processes



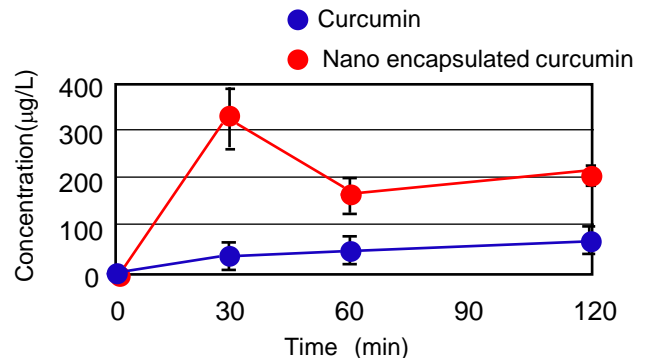
Gastric acid and pancreatic juices treatment test  
Survival ratio of active ingredients( curcumin)



## Improving bioavailability by nanoencapsulation



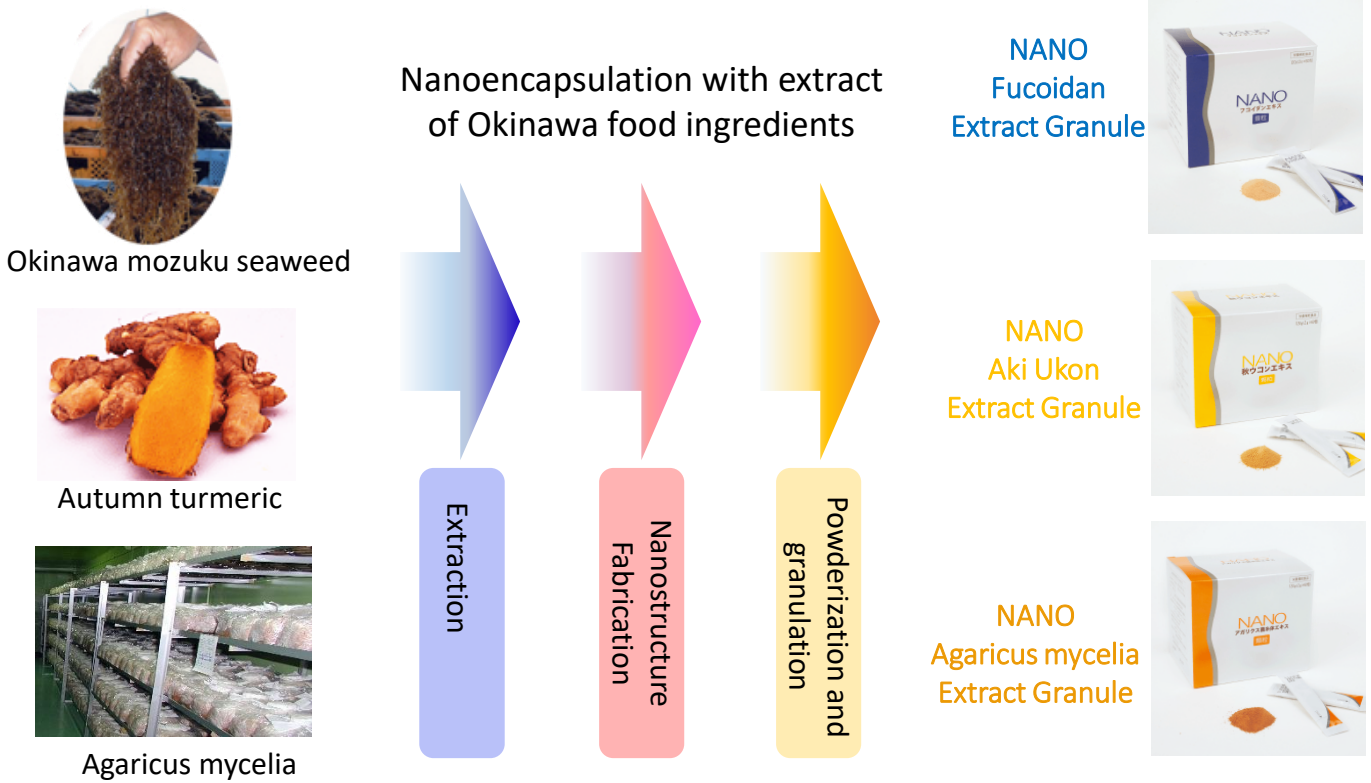
## 【Curcumin concentration in the blood of rat】



Blood level of curcumin was increased to 5 ~10 times in rats took nano encapsulated curcumin compared with rats took curcumin.

We can encapsulate ingredients you demand.  
Please feel free to touch us.

## Example of nano encapsulated products (Kanehide Bio's products)



## Advantages and compatibility of nanoencapsulation with various health food materials

| Materials   | Advantages and compatibility of nanoencapsulation  |
|---|--|
| <p><b><u>Polyphenol group</u></b><br/>Acai, Blue berry and others.</p>  | <p>Improved material's original taste and inhibited decomposition of target ingredient by gastric juice or pancreatic juice. As prevented aggregating between components, can be improved bioavailability as well however amount of target materials have limit in contain until max 30%. Can be 10% of blending ratio if it would be incompatible. Needed solubilization treatment or removing insoluble elements if would be materials in puree.</p> |
| <p><b><u>Green juice materials</u></b><br/>Young barley leaf, mulberry leaves, kale, chlorella, and other Okinawan herbs..</p>  | <p>As the materials are insoluble, they are not good for nanoencapsulation. Extracts can be nano encapsulated meanwhile the final products could change to reddish color ( not being green ).</p>  |
| <p><b><u>Fats group</u></b><br/>Omega 3, turmeric ( curcumin and other essential oils)</p>  | <p>Speculating that nano encapsulated fats can obtain effects such as protecting activate structures or improving tolerance against digestive juices.</p>  |
| <p><b><u>Amino acids / peptides group</u></b><br/>Placenta, Arginine, collagen, royal jelly, imidazole dipeptide and others, black vinegar, moromi vinegar and so on.</p> | <p>It is assumed that it doesn't need improve absorbable for materials expected free amino acids are active ingredients. Regarding nano encapsulated peptides, they can obtain effects such as protecting activate structures or improving tolerance against digestive juices.</p>   |
| <p><b><u>Saccharides • polysaccharides</u></b><br/>Fucoidan, glucosamine, chondroitin, proteoglycan, hyaluronic acid and others.</p>                                      | <p>Basically high molecular materials are difficult to nano encapsulate ( being liposomal ). We have experience of nano encapsulation process after molecular weight reducing treatment.</p>   |

**We can encapsulate ingredients you demand.  
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