



# MULTISENSING PLATFORM USING NANOPOROUS CANTILEVER SENSOR

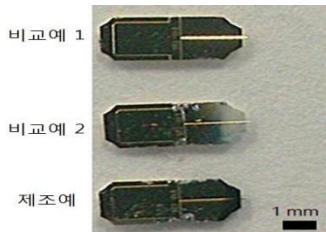
Affiliation : Korea university

Type of Partnership : Open for negotiation

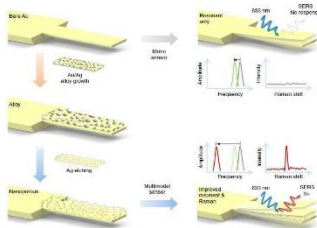
Cost : Open for negotiation

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〈A real image of the resonator〉



〈A conceptual diagram of the nanoporous cantilever〉

## Abstract

It is related to the multi sensing platform using the nanoporous cantilever sensor. More particularly, it is about the nanoporous cantilever which can discriminate the detection molecule by uniting the surface enrichment Raman scattering function of the resonance sensor of the cantilever and nanostructures.

## Problems with Existing Technology

Technology has been developed in order to improve the detection range of the nano-sized toxins.

- It is reported that nanoparticles have adverse effects on humans and the environment because of the small size and large specific surface area properties as well as high reactivity as compared to the conventional materials.
- The use of nano scale materials is increasing in science industry recently.

## Technology Readiness Level

TRL 4 : Technology validated in lab

TRL1	TRL2	TRL3	TRL4	TRL5	TRL6	TRL7	TRL8	TRL9
Basic Technology Research	Technology Concept formulated	Experimental Proof of Concept	Technology validated in lab	Technology validated in relevant environment	Technology demonstrated in relevant environment	System Prototype in operational environment	System complete & qualified	Full commercial application

## Differentiation and Effect

### Differentiation

#### Nanoporous cantilever having a metal and nanoporous structure

- The detection sensitivity is increased at least 10000-fold for the substance to be detected in comparison with the conventional cantilevers.
- Due to the nano-porous structure, it can be easily obtained the Raman signal. Thus, it analyze the molecules easily.

### Effect of Technology

#### Forming a nano-porous structure

- The surface area of the cantilever can be improved, increasing the absorption rate of the material.
- The sensitivity of the resonant sensor as compared to a cantilever that is not formed with a nano-porous structure can be greatly improved. Thus, it has a limit of detection of the concentration lower than  $10^{-9}$  M without the aid of the amplifying device.



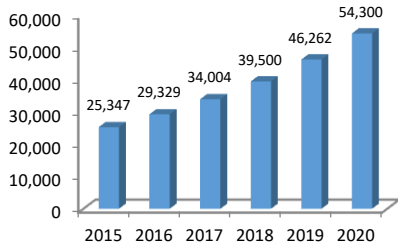
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Technology Application Field

It can be used in various are such as the method and apparatus for detecting chemical, biochemical and environmental toxic substances.



Market Trends



SMEs technology roadmap

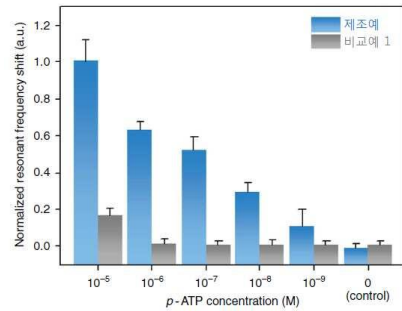
(Prospects of the global market of nano convergence, million USD)

- The global market related to nano-convergence is expected to grow from \$25.3 billion in 2015 to \$54.3 billion in 2020.
- The domestic market of nano-convergence is expected to grow from KRW 3.23 trillion in 2015 to KRW 5.637.1 trillion in 2020.

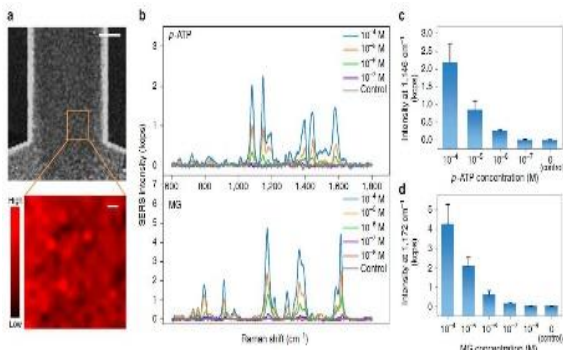
Technology Implementation

Manufacturing method of cantilever sensor

- After the metal/silver alloy layer is deposited on the surface of the tip of the cantilever using the electrochemical deposition method by being fast and etching the simply using the nitric acid the nanoporous cantilever in which the nanoporous structure water of the metal is formed can be manufactured



⟨A graph comparing the normalized frequency shift of the various concentrations of p-ATPs using the resonator⟩



⟨A graph showing the surface-enhanced Raman scattering signal of the detection molecule using the resonator⟩

The method of the molecular detection by using a detection of the change of resonance frequency and the Raman scattering signal.

- The sensitivity of the resonant sensor is proportional to the increase of mass and the probability of absorption of molecules
- The sensitivity of the resonant sensor can be further increased by using a sandwich technique that attaches substances once more to the detection material in order to increase the mass.

List of related patents

No.	Title of Invention	Patent No./ Application No.
1	MULTISENSING PLATFORM HAVING A NANOPOROUS METAL LAYER ON A CANTILEVER SENSOR	US 14/525,970