A Novel Filamentous Adhesive Protein Binding on Any Surface

Background

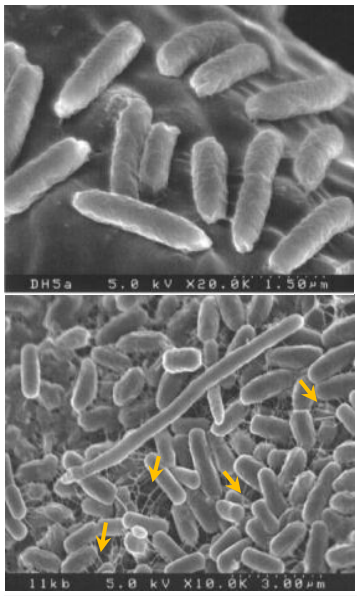
Microorganisms are capable of excellent chemical conversion by their catalytic functions so that they have been used in the production of brewing, bio-ethanol, pharmaceuticals, monomer units in polymers and so on. While microorganisms play very important roles these days in industries, there was a limitation to immobilize microorganisms onto carriers; it's very difficult to bind some microorganisms directly and firmly to carrier surfaces.

Technology

Researchers discovered a new protein to bind microbes to various material surface including plastics, glass, and metals. The isolated gene from *Acinetobacter* was cloned and identified as a type of TTA (Trimeric Autotransporter Adhesin), however, this gene named as AtaA is larger than TTA and has unique repeating Amino-acid sequences.

Other non-adhesive bacteria such as *E. coli* acquired the adhesiveness and became able to adhere to various material surfaces by introducing AtaA gene into their cells. Researchers also found AtaA-transgenic microbes fixed onto carrier produced pigment almost 300 times more than wild-type microbes suspended in a liquid medium.

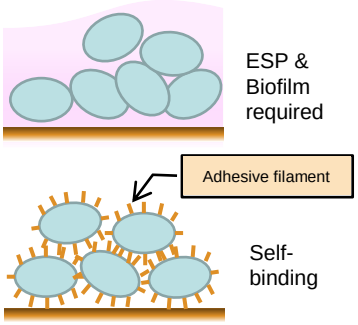
This novel technology to directly fix microbes onto surfaces of any materials that you want to use would dramatically improve the production of bio-fuels, pharmaceuticals, monomers, and so on, and could cut the production cost a lot.



Scanning electron microscopic pictures of E. coli WT(Top) and AtaA transgenic (bottom). The filamentous adhesive protein can be seen. (arrow)

Advantages

- This adhesive protein binds microbe onto surface of any materials.
- The binding is stronger than any other adhesive proteins.
- Easier to create adhesive microbes by AtaA-gene transformation.
- No need extracellular polymeric substance or biofilm.
- Can use normal culture to grow.
- This technology would improve the production and reduce the industrial production process.



The image of immobilization of microbial cells by AtaA

Applications

- More efficient productions by microbes for pharmaceuticals, enzymes, polymers, bio-mass energy.
- More effective effluent water treatment.

Patent: PCT/JP2008/053591, WO/2009/104281A1, EP2256206A1, US2011/0045529A1

Contact:

NU Tech: A-48

Kishu Azama, Ph.D., MBA TEL: 919-535-8724 Email: kazama@tpnu.org Website: http://www.nutechtransfer.org
Technology Partnership of Nagoya University, Inc. One Copley Parkway, Suite 305, Morrisville, NC 27560