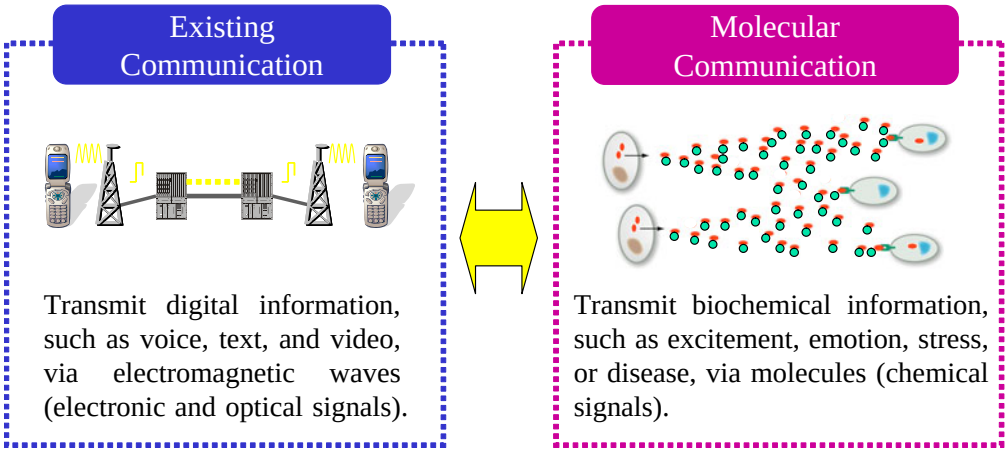
Attachment

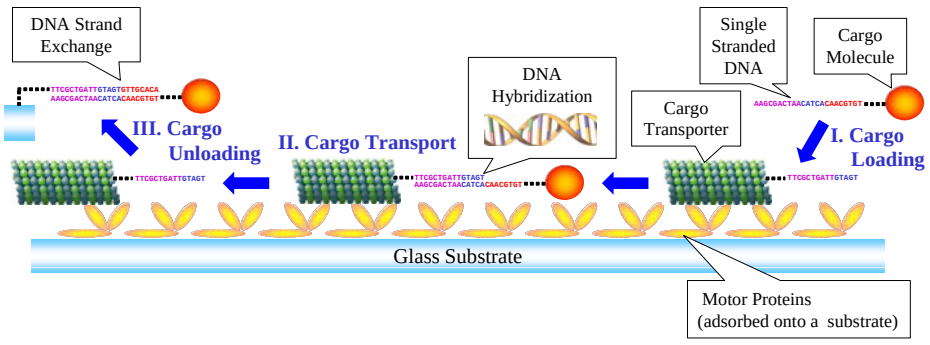
1. Molecular Communication Technology

- A new communication system combining communication technology and biochemistry.
- A controllable, biochemically engineered communication system using cell-to-cell communication and other biological signal-transduction mechanisms in which living organisms transmit/control biochemical information and reactions, such as excitement and emotions, that are hard to encode/transmit using electromagnetic waves.
- A unique system that complements, rather than competes with, existing communication systems.



2. Molecular Delivery System

- Loads a cargo molecule through DNA hybridization[*1] between single-stranded DNAs[*2] attached to a cargo molecule and a cargo transporter (I. in diagram below).
- Transports the loaded cargo molecule by using motor proteins to move (glide) the cargo transporter (II.).
- Unloads the transported cargo molecule (III.) through DNA hybridization between single-stranded DNAs attached to the cargo molecule and a glass substrate (DNA strand exchange[*3]).



Note that an overview of the molecular delivery system was published in the international conference proceedings (21st IEEE International Conference on Micro Electro Mechanical

Systems [MEMS'08], Tucson, Arizona, USA, pp.144-147, January 13-17, 2008). Details of the molecular delivery system will be published in an international paper ("Small," Volume 4, Issue 4, April 2008).

[*1]DNA hybridization: The complementary bases (adenine and thymine, guanine and cytosine) of two single-stranded DNAs bind together to form a double-helix structure (double-stranded DNA).
[*2]Single-stranded DNA: A corded, untwisted DNA strand composed of combinations of the four bases (adenine, thymine, guanine and cytosine).
[*3]DNA strand exchange: Upon untwisting a double-stranded DNA, one of the resulting single-stranded DNA and a third single-stranded DNA bind together to form a new double-stranded DNA.

3. Mobile Phone with Biochip

- A mobile phone with a biochip, which is packaged with a molecular delivery system that transports biomolecules in a drop of the user's sweat or blood from one micro-reactor with a reagent to another for various biochemical analysis.
- The data resulting from the biochemical analysis are transmitted by the mobile phone, using a traditional wireless network, to a medical specialist.
- The specialist interprets the data for medical diagnosis of disease, stress, etc.
- Possible applications include health checkups and preventive medicine.