

## Investigation of “Nano-Cotton” effect in aqueous hyaluronan solution

**Kiminori Ushida**

*Eco-Soft Materials Research Unit, Riken*

The function of aqueous hyaluronan (HA) solution is investigated focusing on the transport phenomena occurring inside the media which is a model matrix involved in extracellular matrices (ECM). With measurements of diffusion coefficient using three kinds of spectroscopy, the distance dependence of the diffusion coefficient (DDDC) was observed for small molecules and globular proteins. In short diffusion ( $< 10$  nm), the diffusing molecules are not interfered with by the mesh structure of HA and the diffusion coefficient was the same in the aqueous solutions without HA. On the other hand, for long diffusion ( $> 100$  nm), the diffusion coefficient was significantly dependent on the HA concentration showing that the magnitude of diffusion coefficients was decreased due to the interaction with the polymer chain. The curve of DDDC was successfully obtained by the present experiment indicating that the anomalous diffusion occurs in the 10-100 nm area of diffusion distance. The HA matrix, which is an important member of ECM, acts as if an cotton ball holding moisture the string mesh of which is in nanometer scale. We named this function as “Nano-Cotton”. HA nano-cotton acts not only as a fine matrix holding a large amount of water but also as a media controlling the transport phenomena inside ECM in terms of anomalous diffusion which affects on various dynamics of cell activities such as cell adhesion, tumor migration and invasion and others.