부동섬모에 대한 역학적 모델 해석

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The Mechanical Model Analysis of the Stereocilia Bundle

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Key Words: Stereocilia(부동섬모), Mechanical Model(역학적 모델), FSI(유체-구조물 상호관계), Stiffness(강성)

Abstract : The mechanical model of the stereocilia bundle has been built using the finite element method. The stereocilia bundle was assumed to be isotropic and linearly elastic in mechanical properties. In the simple structure model, the deflection and the stiffness of the stereocilia bundle were calculated and examined with respect to the variation of the mechanical properties and the geometry. The maximum stiffness value was 6.894 mN/m and the deflections of the stereocilia were 3.55, 2.79, 2.09 nm when the applied force was 10 pN and the Young's modulus of tip-link is 3 GPa. In the FSI model, the deflection of the stereocilia was investigated based upon the interaction between the stereocilia and the lymph fluid.

원자현미경을 이용한 생물시료의 생물리학적 분석기법 개발과 소개

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Introduction and Development of biophysical analysis technique for biological sample using SPM technique

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Key Words: Atomic Force Microscopy (원자현미경), Scanning Probe Microscopy (주사탐침현미경), Biophysical measurement (생물리학적 측정)

Abstract : In order to develop fundamental nature-inspired technologies for future, various fields of science and technology have been invested to understand the complex biological system. Among the vast array of technologies, nano-technological devices like the Scanning Probe Microscope (SPM) start to open new chapter of understanding structure, function, and regulation of this complex biological system at the nanometer level in real time with a hope for new scientific discovery. SPM provides not only high-resolution imaging of cellular structures below the optical limit, but also evaluation of biophysical properties of the biological samples and monitoring dynamics and processes even in real time. SPM technique promises direct access to the both structural and functional information of a biological sample at unprecedented high spatial resolution that no other techniques are able to provide currently. We will introduce the general applications and new development of SPM in life science research.