**AFM-based Force Spectroscopy for**

**DNA Ligation and DNA Sequencing at the Single Molecule Level**

**Eung-Sam Kim, Ph.D.**

Department of Biological Sciences, Chonnam National University, Gwangju, Korea

**Abstract**

Nanomechanical approaches such as optical/magnetic tweezers and atomic force microscopy (AFM) have been employed to analyze and manipulate biomolecular behaviors in aqueous conditions. When we functionalized the surface of an AFM tip with mesospaced dendron molecules, the dendron-coated AFM tip could detect the force transition due to the single enzymatic DNA ligation between the AFM tip and substrate on which complementary DNA strands were immobilized. This work allowed us to implement covalent patterning of single DNA molecules at the standard condition. Furthermore, the specific unbinding force upon the dissociation of the DNA polymerase and nucleotides attached on the AFM tip and substrate, respectively, made it possible to read the DNA sequence of a single template DNA captured in the DNA polymerase.