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휴대형 디바이스를 이용한 단일염기다형성 식별

(Single nucleotide polymorphism (SNP) discrimination on a portable device)

Abstract:

This study introduces a thermoplastic microdevice performing loop-mediated isothermal amplification (LAMP) and silver nanoparticle-based colorimetric detection for the discrimination of single nucleotide polymorphism (SNP). To discriminate single nucleotide difference via nucleic acid amplification, allele-specific LAMP reaction applying nucleotide-mismatched primers and molecular additives was evaluated. Hydrazine was used as a reducing agent to produce silver nanoparticle for the endpoint colorimetric detection of amplicons in less than 3 min at ambient condition. The microdevice consists of a purification unit and a reaction unit allowing for DNA purification, amplification, and detection in a sequential manner. DNA purification was realized using glass fiber membrane. The versatile applicability of the introduced microdevice was demonstrated by successfully identifying SNPs related to sickle cell anemia and genetically induced hair loss. The introduced microdevice can also be used as a promising tool for bedside identification of the susceptibility to many SNP related genetic mutation disorders such as alzheimer's disease and depression.

Brief Biosketch

Nae Yoon Lee is currently a professor in the Department of BioNano Technology at Gachon University in South Korea. She received her BEng (1998) and MEng (2000) from the Department of Environmental Engineering in Ewha Womans University in Korea, and PhD (2004) from the Department of Chemistry and Biotechnology in the University of Tokyo in Japan. Since 2004, she published 130 articles and registered 25 patents. She has been the member of the Korean BioChip Society (KBCS) since 2013. Her main research field is concerned with the development of functionally integrated Lab-on-a-Chip and paper device for Point-of-Care Testing (POCT).