**Thermal lens detection of DNA using unmodified gold nanoparticles in microchip.**

**Behnaz Abbasgholi Nejad Asbaghi1, Nader Shokoufi\*2**

1 Department of Green Technologies, Chemistry and Chemical Engineering Research Center of Iran (CCERCI), Tehran, Iran, [Be.asbaghi@yahoo.com](mailto:Be.asbaghi@yahoo.com)

2 Department of Green Technologies, Chemistry and Chemical Engineering Research Center of Iran (CCERCI), Tehran, Iran, [shokoufi@ccerci.ac.ir](mailto:shokoufi@ccerci.ac.ir)

**Behnaz Abbasgholi Nejad Asbaghi**

**Abstract:**

In this work we report on a new sensitive method for detecting DNA by photothermal lens microscopy in microfluidic chip. A specific sequence of DNA was detected using unmodified gold nanoparticles in a glass microchip with Y-shaped channel. The different adsorption affinity of single and double stranded DNAs on gold nanoparticles was used for highly rapid and sensitive DNA detection by photothermal lens effect in a femtoliter scale of detection volume.

Under the optimized conditions, the focal volume of 105 fL (10-15 L) was obtained as detection volume. The variation of photothermal lens signal in the detection volume was linearly proportional to the target DNA concentration over the range of 50-500 nM with detection limit of 29 nM for target DNAs. The lowest amount of target DNA that was measured in the detection volume was 2.6 zepto mole. The assay was completed within 5 min and the relative standard deviations (n=8) for both target DNAs were about 2.34%.

Two different common methods including gel electrophoresis and in situ fluorescence monitoring of DNA hybridization were used for proving the hybridization in this method. The proposed detection method was successfully performed in diluted human serum sample with recovery values between 98 % and 104.9%. The method is fast and homogeneous because it occurs exclusively in the liquid phase, a feature that makes it easy to be applied for online monitoring in the flow mode and lab on a chip applications. This presentation encourages the researchers to develop this method for recognition of single-base-pair mismatches between probe and target which is highly important in biological detection of single nucleotide polymorphisms.

**Biography of presenting author**

Behnaz Abbasgholi nejad asbaghi is studing analytical chemistry at chemistry and chemical engineering research centre of Iran (CCERCI), Iran. She graduated as MS in 2012 at the same research centre. Her PhD thesis is supervised by Dr Shokoufi at the Spectroscopy and Instrumentation Laboratory. This thesis focuses on development of photo thermal lens technique for analysis of biomolecules and investigation of DNA hybridization using gold nanoparticles in a microchip. Recently, she has published two papers about analysis of biomolecules by photo thermal lens spectroscopy.

**Details of presenting author to be mentioned in certificate:**

Name: Behnaz Last name: Abbasgholi nejad asbaghi

Affiliation: Chemistry & Chemical Engineering Research Center of Iran (CCERCI)

Country: Iran