

# Poly (acrylic acid)-coated liquid crystal droplets for sensitivity detection of Beta-amyloid1-42 ( $A\beta 1-42$ )

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The E7(nematic) droplets are prepared by using vortex mixer, which was used for detection of Beta-amyloid1-42 ( $A\beta 1-42$ ). The E7 droplets were stabilized by poly (acrylic acid)/Sodium dodecyl sulfate (SDS) which was showing radial structure in Polarizing Optical Microscope (POM). In order to detect Beta-amyloid1-42 in aqueous solution, we have anchored the anti- Beta-amyloid1-16( $A\beta 1-16$ ) on the LC droplets. The anchored LC droplets sense the Beta-amyloid1-42 ( $A\beta 1-42$ ) through configuration changes from radial to bipolar structure. We found that orientational changes of the LC droplets are due to the binding of antigen and antibody at the surface of the LC droplets. The sensing of the LC droplets depends on concentration of the Beta-amyloid1-42 ( $A\beta 1-42$ ). With this novel approach we can detect Alzheimer's disease by observing optical reflection pattern. PAA/SDS droplets are, simple, label-free detection for Alzheimer's disease.

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## **References**

- [1] Kyubae Lee, Kailash Chandra Gupta, and Soo-Young Parka D. Inn-Kyu Kang\*, J. Mater. Chem. B, 2016, 4, 704--715, DOI: 10.1039/c5tb02131f
- [2] Tsung-Keng Chang, Pei-Chi Tung, Mon-Juan Lee, \*, Wei Lee \*\*, Biosensors and Bioelectronics 216 (2022) 114607, <https://doi.org/10.1016/j.bios.2022.114607>
- [3] Hyun-Gyu Lee, Sundas Munir, and Soo-Young Park\*, ACS Appl. Mater. Interfaces 2016, 8, 26407–26417, <https://doi.org/10.1021/acsami.6b09624>
- [4] Emine Kemiklioglu,,\* Ebru Busra Tuncgovde and Gonen Ozsarlak-Sozer, Journal of Bioscience and Bioengineering, <https://doi.org/10.1016/j.jbiosc.2021.03.016>