Electrospun nanofiber-based assay design for pathogen detection

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Enterohemorrhagic *Escherichia coli (*EHEC) serotype O157:H7 is a food-borne pathogen that younger children are most prone to this microorganism. Hemolytic Uremic Syndrome (HUS) caused by EHEC, leads to the destruction of red blood cells and kidney failure. I most cases, the infection is self-limited in young children and aged population, it may cause HUS. Therefore, several investigations are performed to offer effective therapies and vaccines, which can prevent and treat the infection in appropriate time. As the pathogenesis of this infection is complicated, so new biotechnology methods are required[1]. Diagnostic techniques based on biomolecules, have many application areas that can be used. Immobilization of biomolecules to conductive surfaces is necessary to increase these properties. Electrospinning is one of the common biotechnological method that it can be used[2]. Nanofibers which are formed by electrospinning technique, in the immobilization of biomolecules to surfaces; is using due to its advantages such as morphology and pore size. Polycaprolactone (PCL), is a non-hazardous, hydrophobic, semi-crystalline and biocompatible polymer[3]. One of the essential strategies for improving mechanical properties and time of degradation of PCL-based materials can be the incorporation of nanostructures in PCL in the form of blend materials or as a copolymer[4]. Poly(amidoamine) (PAMAM,) which can be prepared with a few successive generations of synthetic reactions, has a structure that can be easily controlled due to its high density of cationic charges display electrostatic interactions with nucleic acids.

In this study, nanofiber was formed by electrospinning technique using polycaprolactone (PCL) and polyamidoamine dendrimer generation (PAMAM G5). Aptamer bonded using the surface binding potential of nanofibers. An assay was developed for the detection of *E.coli* O157:H7 by conjugation using the target-specific binding property of the aptamer.

References

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