Separation-sensing membrane for dynamic blood sieving and testing in clinical surgery and emergency

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Abstract:
Dynamic and on-site analysis of serum from human blood is crucial especially for making decisions during clinical surgery and emergency treatments. However, state-of-the-art blood assay methods can only collect single or discrete data of physiological analytes; thus, remaining a great challenge in the online reports of the dynamic fluctuation of key analytes. In order to address above issue, we have proposed a new-concept membrane to integrate principles of membrane separation and electrochemical biosensor together, achieving the serum collection and analysis from whole blood simultaneously. Relying on our developed various methods of nanostructure control, the membrane material can be exactly built to form porous separation layer and electroanalytic biosensing layer which realizes the blood sieving and key indices detection. This membrane achieved accurate and online glucose and lactate monitoring in patients with a variety of medical conditions within 1 min, which is one order of magnitude faster than the state-of-the-art techniques. Furthermore, this technique has been successfully transferred to commercial products which have already been applied in more than 4 hospitals with over 300 clinical cases.

Keywords: separation-biosensing membrane; blood sieving; dynamic detection; clinical online monitor

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