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Immunoassay on Free-standing Electrospun Membranes ANDREW STECKL, DAPENG WU, DAEWOO HAN, University of Cincinnati — For the purpose of immunoassay, electrospun membranes can be thought as the thread-like self-assembling of nano/microbeads. Non-woven membranes of electrospun poly(caprolactone) (PCL) fibers display excellent tenacity, flexibility and suitable surface energy. These PCL membranes exhibit easy handling in air, fast spreading and wetting in aqueous solution, and rapid adsorption of protein molecules by hydrophobic interaction. After a *fold-and-press* process, the membrane porosity was reduced from $\sim 75\%$ to less than 10% , while the thickness increased from ~ 5 to $300\ \mu\text{m}$. The resulting fluorescence signal from adsorbed protein increased more than 120 times. With anti-HSA and HSA-FITC as an immunoassay model, a linear detection range from $500\ \text{ng/mL}$ down to $1\ \text{ng/mL}$ is obtained, with a detection of limit (LOD) of $\sim 0.08\ \text{ng/mL}$. By comparison, conventional nitrocellulose and thicker PCL fiber electrospun membrane displayed a much higher LOD of $\sim 100\ \text{ng/mL}$. Immunoassay on free-standing electrospun membrane successfully combines the low-cost and simplicity of conventional membrane immunoassay, with the fast reaction speed and high sensitivity characteristic of magnetic nano/microbeads bioassays.

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