

Fig. S1 Three-dimensional structure of pit membrane.

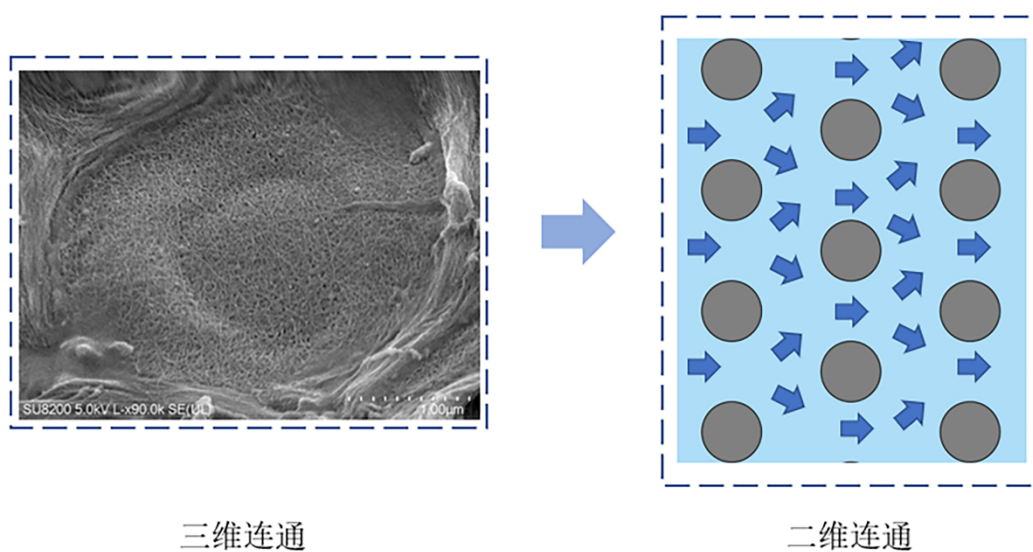


Fig. S2 Simplified model.

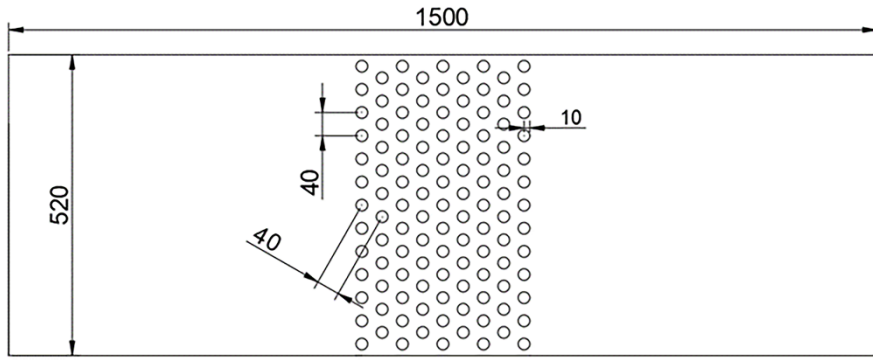


Fig. S3 Schematic diagram of the calculation model structure. (unit: nm)

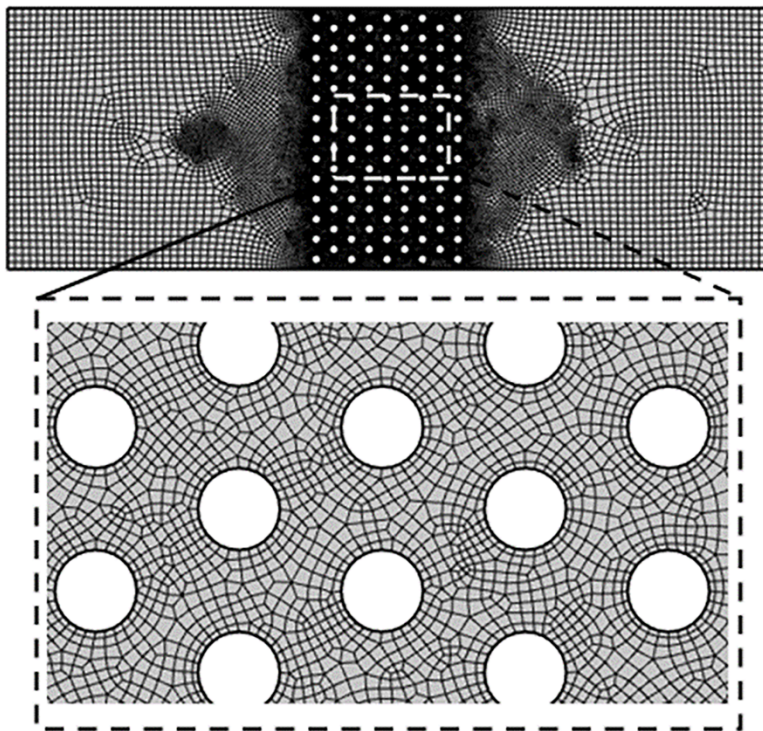


Fig. S4 Schematic diagram of meshing of computational model.

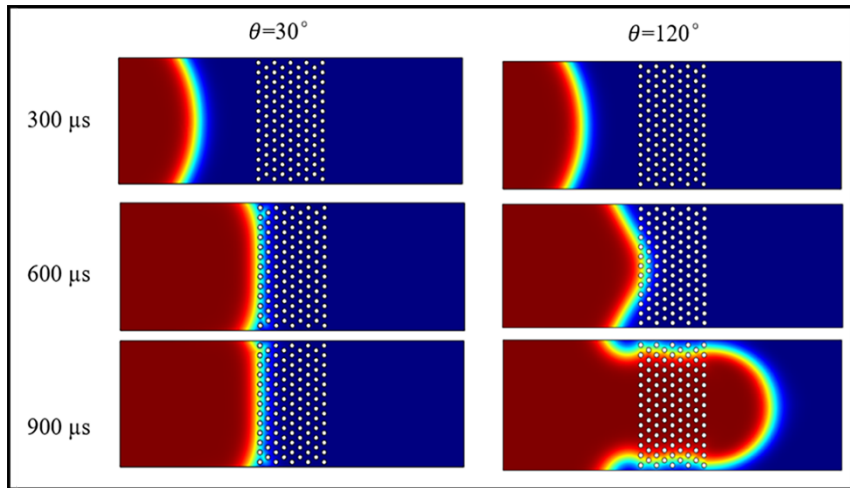


Fig. S5 Effect of surface wettability on bubble filtration.

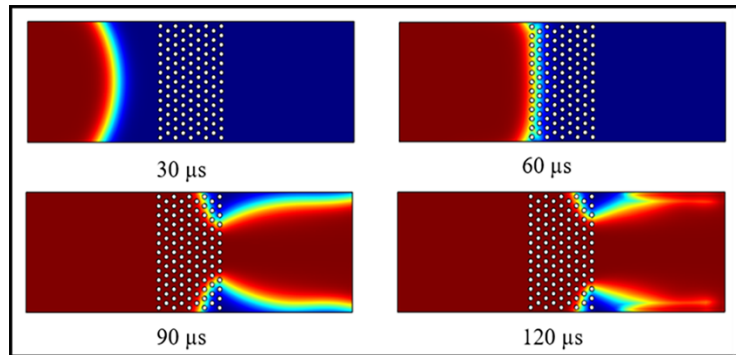


Fig. S6 Flow process of gas phase under 6.4MPa pressure.

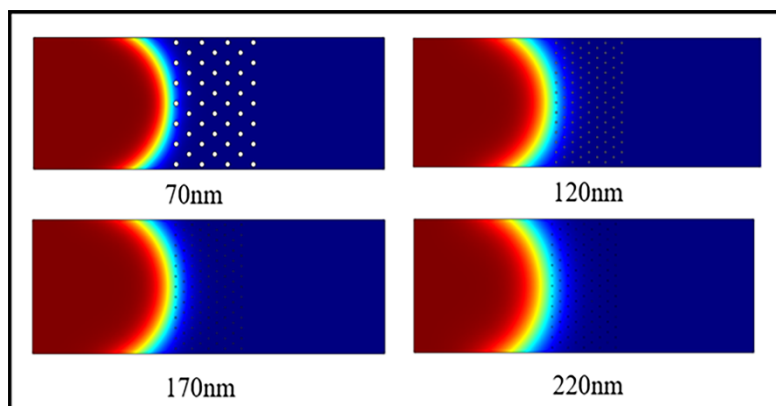


Fig. S7. Simulation results of models with pore sizes of 70nm, 120nm, 170nm and 220nm.

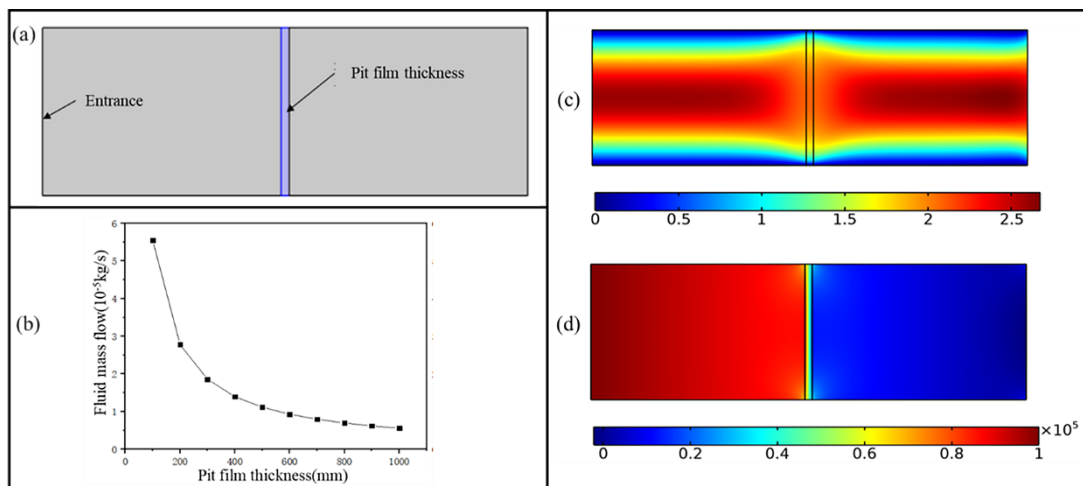


Fig. S8 Simulation results of the influence of pitted film thickness on fluid flow. (a) Division of the simulation model of the influence of pitted film thickness on fluid flow. (b) Relationship between pitted film thickness and fluid mass flow. (c) Effect of pitted film thickness on fluid flow simulation velocity cloud map, m/s. (d) Effect of pitted film thickness on fluid flow simulation pressure cloud map, Pa.

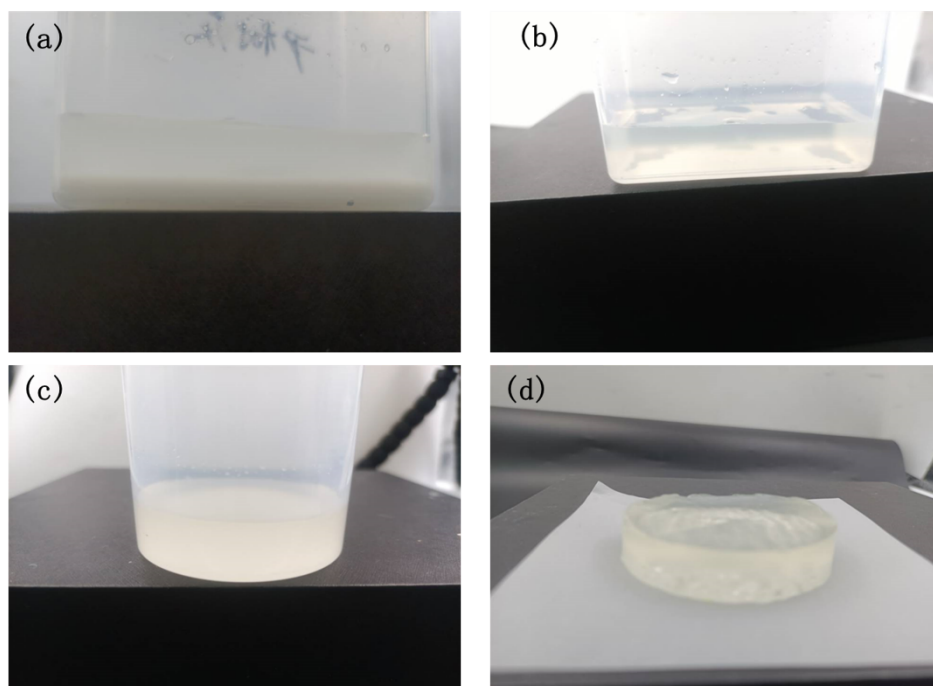


Fig.S9 Fabrication of cellulose/PVA hydrogels.



Fig.S10 Contact angle of cellulose/PVA hydrogel.

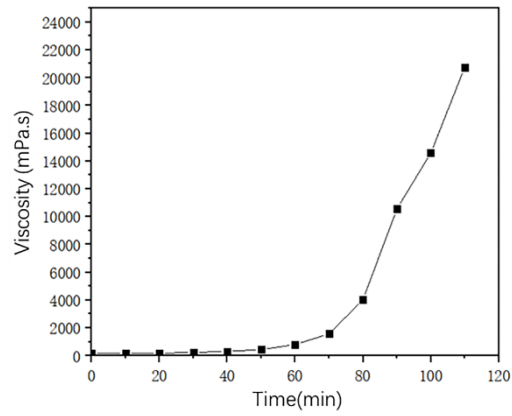


Fig.S11 Variation of gel solution viscosity with time.

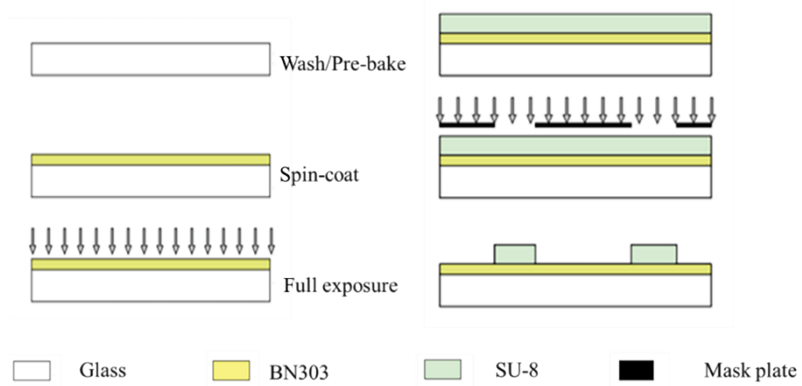


Fig.S12 SU-8 mold making process.