ERRATUM

Preparation and Characterization of Chitosan/Cu(II) Affinity Membrane for Urea Adsorption

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When this article was first published, p. 1111 contained several errors. It is being reprinted here (see next page, p. 3458) with all corrections included.

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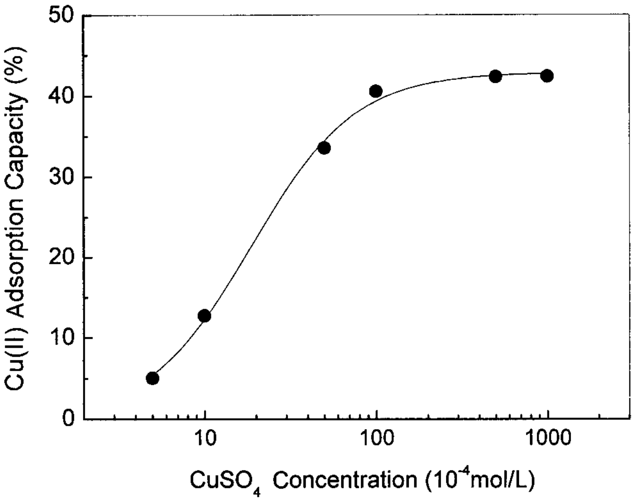

Figure 4 Influence of initial $CuSO_4$ concentration on Cu(II) adsorption capacity of macroporous chitosan membrane.

membrane as the matrix to prepare a novel macroporous chitosan/Cu(II) affinity (complex) membrane.

Figure 4 represents the effect of loading concentration of $CuSO_4$ on the Cu(II) adsorption capacity of the macroporous chitosan membrane. With the increase of loading concentration, the amount of Cu(II) adsorbed onto the membrane increased. When the loading concentration was higher than 5×10^{-2} mol/L, the adsorption capacity of the Cu(II) leveled off, which meant the adsorption equilibrium had been reached. The morphology of the macroporous chitosan membrane did not change much after the adsorption of Cu(II) (Fig. 5).

As our chitosan/Cu(II) affinity membrane is supposed to be used in hemodialysis to remove urea, we need to consider its hydrophilicity. We know that hydrophilicity is favored in biotechnology and medical utilization; however, if the hydrophilicity is too high, excess swelling of the membrane will cause many problems, such as the leakage of the membrane into the device during the process. Chitosan is a high hydrophilic material because it has plenty of amino groups and hydroxyl groups in its structure. Its swelling ratio to water was beyond 400%, as shown in Figure 6. After the adsorption of Cu(II), the swelling ratio declined to 100–200%, which would be more suitable for its application. The reason for the decrease of the swelling ratio was probably Cu(II) acting as a crosslink agent to crosslink chitosan.[20] Thus we assumed that when the chitosan membrane was immersed in $CuSO_4$ solution, the hydrophilic groups in chitosan (mainly —NH_2 groups) were coordinated with Cu(II) ions to form a "crosslinked" structure. The more Cu(II)ions coordinated the hydrophilic groups in chitosan, the higher the crosslinking degree of the membrane, and the lower swelling ratio.

In order to support our assumption, we need to discuss the Cu(II)-chitosan complexation mechanism,

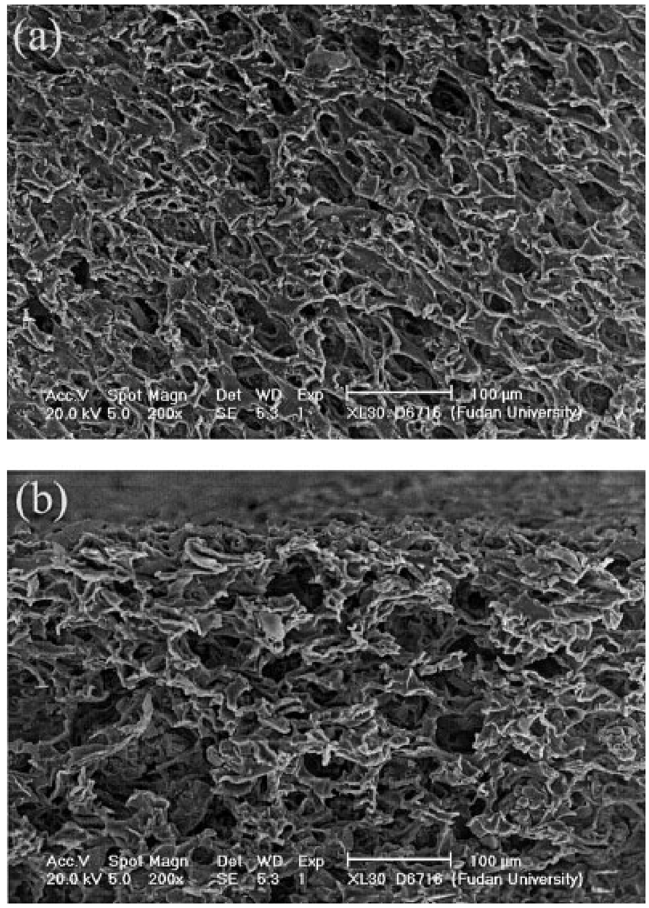

Figure 5 SEM photographs of macroporous chitosan/Cu(II) affinity membrane: (a) surface, (b) cross section (silica/chitosan = 10/1, initial $CuSO_4$ concentration = 10^{-2} mol/L).

although the main purpose of this article is not fundamental study. There have been many studies on the mechanism of the complexation, and different models

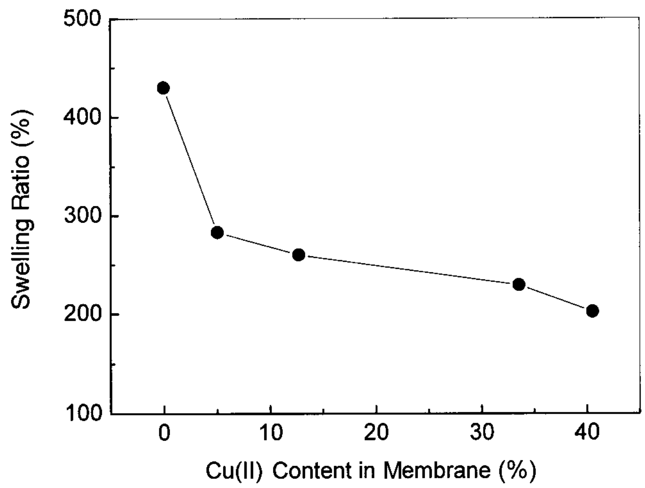

Figure 6 Influence of Cu(II) content in membrane on swelling ratio of macroporous chitosan/Cu(II) affinity membrane.