Technical Applications Bulletin 102

Surface Characteristics of LG Chem's NanoH$_2$O^{TM} RO Membranes

Membrane surface roughness and zeta potential are measured to analyze the surface characteristics of LG Chem's NanoH2O membranes. It is understood that membrane surface roughness is correlated with colloidal fouling of RO membranes. Colloidal particles can plug the valleys of the relatively open and rough membrane surface, effectively increasing the resistance to water transport. In essence, lower surface roughness can contribute to reduced colloidal fouling potential. Surface roughness is represented by the root mean square (RMS) roughness. The roughness of LG Chem's NanoH2O RO membranes is shown in Table 102.1 below.

Table 102.1 Summary of membrane RMS surface roughness obtained using AFM

Membrane Type	LG SW ES	LG SW R	LG SW SR	LG BW R	LG BW AF
Average RMS (nm)	112	105	107	94	94

The polyamide membrane typically carries a negative membrane surface charge. The interactions with charged foulants can be reduced by altering the membrane surface charge. Using neutral compound to cover the negative charges of the polyamide mem- brane surface can reduce the interactions between charged foulants and the membrane surface. LG Chem's NanoH2O BWRO products show a surface charge closer to neutral between pH 6 to 10 due to the cross linking protective layer. In addition, this antifouling layer protects the membrane's surface to reduce damage to the polyamide membrane surface during CIP operation between pH 2 to 13.

Figure 102.1 LG Chem's NanoH2O BWRO membranes zeta potential data compared to other commercially available membranes