Electronic Supplementary Material (ESI) for RSC Advances
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The transmittance of FM0.4

As shown in Figure 1, the transmittance of FM0.4 is only about 98.9%. The refractive index of FM0.4 is about 1.12. The reflection of a thin film can be calculated by the following equation:

$$R=(n_c^2-n_an_s)^2/(n_c^2+n_an_s)^2$$

where n_c, n_a and n_s are the refractive indics of the coating, air and substrate, respectively. The calculated transmittance is in good agreement with that characterized by UV-vis spectrophotometer. This means that the low refractive index of FM0.4 is determined by the refractive index but not caused by the light scatter.

For glass substrate, to obtain 100% transmittance, the refractive index of single-layer AR coating should be about 1.22. Many researches had engaged in preparation of ORMOSIL thin films from co-condensation of DDS and TEOS. However, they did not use these thin films as AR coating in high power laser system was probably because the refractive index is far from the theoretical value (1.22). Due to the ultra-low refractive index of 1.12, the transmittance of this ORMSIL AR coating (i.e. FM0.4 in this work) is poor. In our group, we applied a second layer between the glass substrate and FM0.4 to increase the transmittance to 100%. The schematical representaion of this double-layer AR coating is shown in Figure 2. Table 1 shows some double-layer AR coatings with FM0.4 as top layer and bottom layer with different refractive indices. As shown in Talbe 1, The refractive index of double-layer AR coatings with FM0.4 as top layer possess almost 100% transmittance.

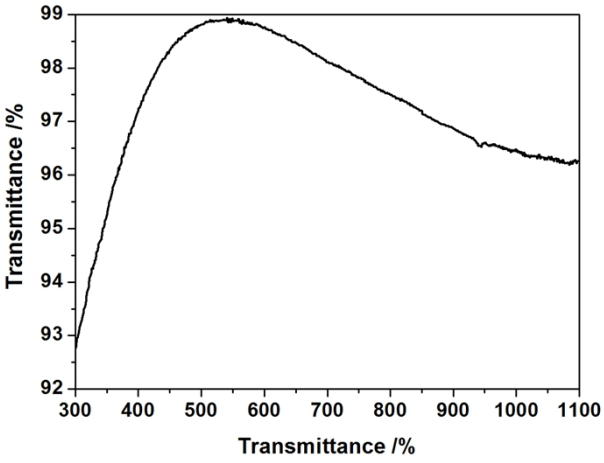

Figure 1 Transmittance spectrun of FM0.4

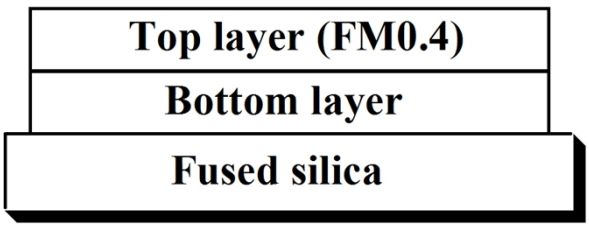

Figure 2 Shematical representaion of double-layer AR coating

Table 1 Double-layer AR coatings with FM0.4 as top layer

Sample number	bottom layer		top layer (FM0.4)		$T_{1064\ nm}$ [%]	$T_{532\ nm}$ [%]
	n_1	Thickness[nm]	n_2	Thickness[nm]		
C1	1.27	139.8	1.12	158.5	99.97	99.97
C2	1.28	138.7	1.12	158.5	99.98	99.98
C3	1.29	137.6	1.12	158.5	99.96	99.96
C4	1.30	136.5	1.12	158.5	99.94	99.94