

## Supplementary Information

Table S1 Values of  $k_{\text{eff}}$ ,  $k_{\text{III}}$ ,  $\Lambda$ , and  $\Omega_{\text{III}}$  obtained from fitting data of electrical conductivity relaxation for SFM-SDC composites. Values are given for different SDC phase volume fractions ( $f_{\text{SDC}}^{\text{V}}$ ) and  $p\text{O}_2$  steps. Values of  $\Omega_{\text{III}}$  were calculated using Eq. 12.

$f_{\text{SDC}}^{\text{V}}$ /-	$p\text{O}_2 : 0.01 \rightarrow 0.1 \text{ atm}$					$p\text{O}_2 : 0.1 \rightarrow 1 \text{ atm}$				
	$k_{\text{eff}}$ / $10^{-7} \text{ m s}^{-1}$	Error of $k_{\text{eff}}$ / $10^{-9} \text{ m s}^{-1}$	$k_{\text{III}}$ / $10^{-7} \text{ m s}^{-1}$	$\Lambda$ /-	$\Omega_{\text{III}}$ /-	$k_{\text{eff}}$ / $10^{-7} \text{ m s}^{-1}$	Error of $k_{\text{eff}}$ / $10^{-9} \text{ m s}^{-1}$	$k_{\text{III}}$ / $10^{-7} \text{ m s}^{-1}$	$\Lambda$ /-	$\Omega_{\text{III}}$ /-
0	1.24	0.0264	0	1.00	0	3.67	0.153	0	1.00	0
0.105	5.87	0.213	4.75	5.26	0.810	14.1	0.742	10.8	4.28	0.766
0.223	9.77	1.06	8.75	9.62	0.906	21.7	4.06	18.7	7.26	0.862
0.353	6.68	0.288	5.83	7.83	0.872	17.2	4.11	14.6	6.83	0.854
0.501	9.45	11.4	8.74	13.2	0.924	21.0	5.85	18.9	9.94	0.899
0.667	7.00	0.429	6.58	17.0	0.941	16.8	4.53	15.6	13.8	0.928

5

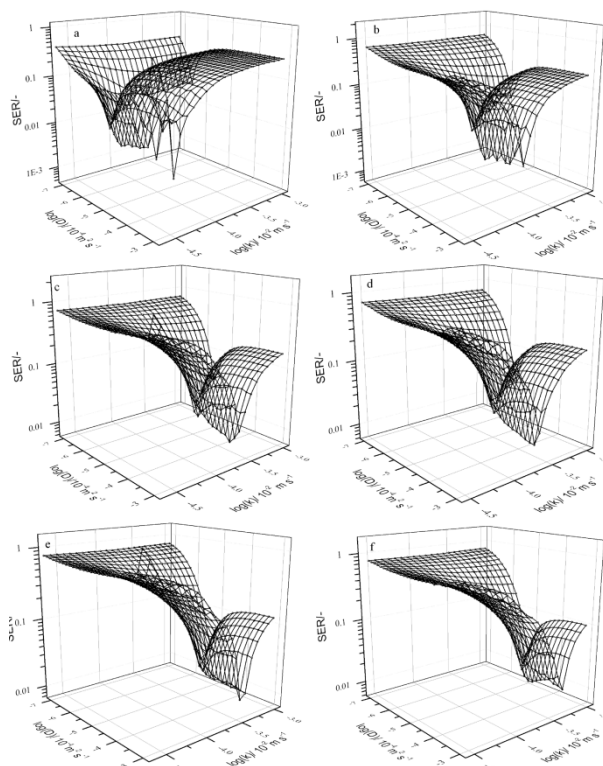


Fig. S1 Standard error plots of  $k$  and  $D$ . Plotted is the standard error of regression (SER), while varying  $k$  in the range  $10^{-5} \sim 10^{-3} \text{ cm}^2 \text{ s}^{-1}$  and  $D$  in the range  $10^{-7} \sim 10^{-3} \text{ cm}^2 \text{ s}^{-1}$ . Shown are data for SDC phase volume fractions,  $f_{\text{SDC}}^{\text{V}}$ : a) 0, b) 0.105, c) 0.223, d) 0.353, e) 0.501 and f) 0.667. The  $p\text{O}_2$  step change is from 0.1 atm to 1 atm.