Supplementary material

$$\theta(t) = \frac{\lambda_c}{L}\sqrt{\frac{J\beta_0}{n_0}t} \quad (1)$$

With θ - the surface coverage, λ_c - the reaction front width, L - total length of the pores, n_0 - the substrate surface sites density, J - the flux of molecules to surface, β_0 - the sticking coefficient and t - the time.

$$\lambda_c = \frac{4}{\bar{s}}\sqrt{\frac{2}{3\beta_0}} \quad (2)$$

Where $\bar{s}$ is the surface area to void volume ratio.

References
1. Ma *et al.,* Adv. Mater. Interfaces, 2016, 3, 1600564; DOI: 10.1002/admi.201600564
2. Wang *et al.,* Journal of Power Sources, 2013, 233, 1-5; DOI: 10.1016/j.jpowsour.2013.01.134
3. Gao *et al.,* Materials Today, 2020, 40, 140-159; DOI: 10.1016/j.mattod.2020.06.011
4. Szmyt *et al.*, Chem. Mater. 2022, 34, 203−216; DOI: 10.1021/acs.chemmater.1c03164

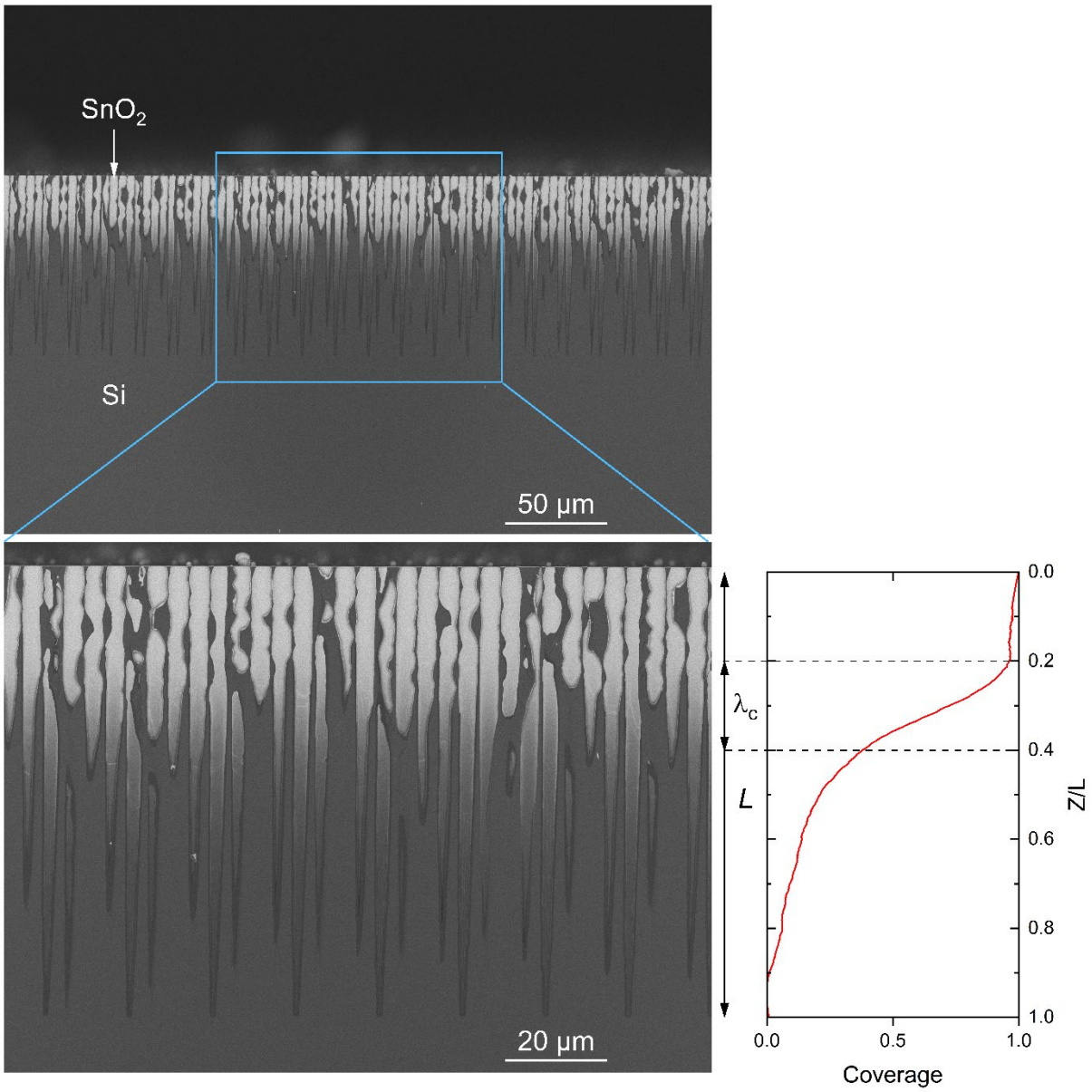

Figure 1 Cross-section topography of porous Si substrate coated with SnO2 by ALD. The pores opening and the holes depth are about 2 and 100 µm, respectively, providing an aspect ratio of 50. Pictures were acquired by scanning electron microscope (SEM) employing in-beam back scattered electron sensor.