

Anisotropic growth of $\text{Ni}_3(\text{BO}_3)_2$ nanowhiskers on nickel substrates and its application in the fabrication of superhydrophilic surfaces

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Electronic Supplementary Information

Fig. S1 presents SEM images of $\text{Ni}_3(\text{BO}_3)_2$ nanowhiskers with polyhedral tips. The high-magnification SEM image presented in Fig. S1b clearly reveals a polyhedral morphology, in good agreement with the TEM observation (Fig. 1(f)). Fig. S2 presents the TEM results for an individual nanowhisker exhibiting a diameter transition. HRTEM images indicated that no stacking faults or lattice mismatches were present in the transition zone, implying good crystallinity of the nanowhisker. Figure S3 presents SEM images of the product fabricated at 950 °C for 4 h with 10 wt% MnO_2 . From Fig. S3a, it can be observed that abundant $\text{Ni}_3(\text{BO}_3)_2$ nanowhiskers grew directly on the substrate surface. In addition, free-standing nanowhiskers were also observed (Fig. S3b). Fig. S3c shows the residual manganese oxide bulk structures. Fig. S4 shows the SEM images of the products fabricated using 3 wt% KClO_3 , 3 wt% KCl , 3 wt% K_2SO_4 and 3 wt% NaCl as the agents, respectively. It can be seen that only a few short microrods were obtained. A schematic illustration of the wetting behavior between two nanowhiskers is presented in Fig. S5. Fig. S5a depicts the basic relation between d_0 and r , as defined in Duprat's theory.⁵⁶ A schematic illustration of the complete wetting process between two nanowhiskers with ultra-high aspect ratios is presented in Fig. S5b.

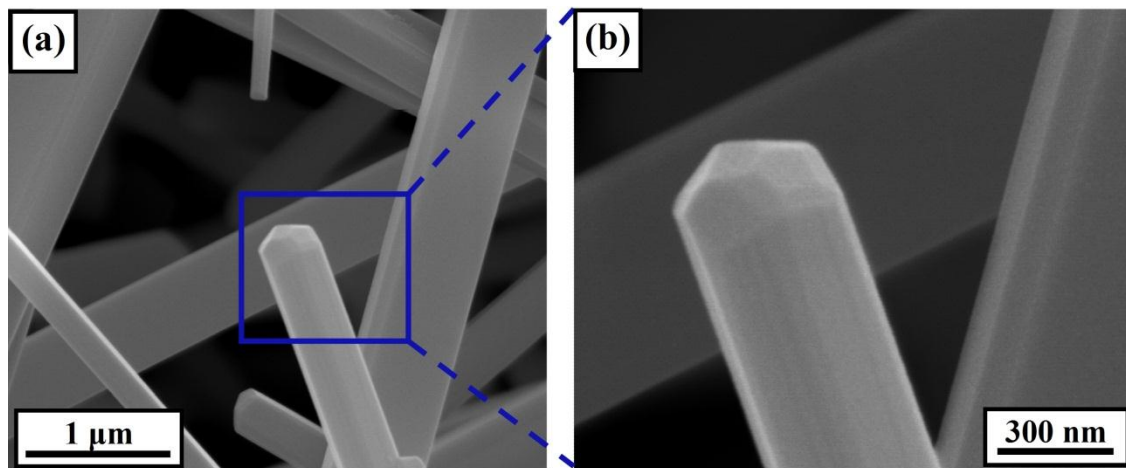


Fig. S1 SEM images of $\text{Ni}_3(\text{BO}_3)_2$ nanowhiskers showing the polyhedral morphology of the tips.

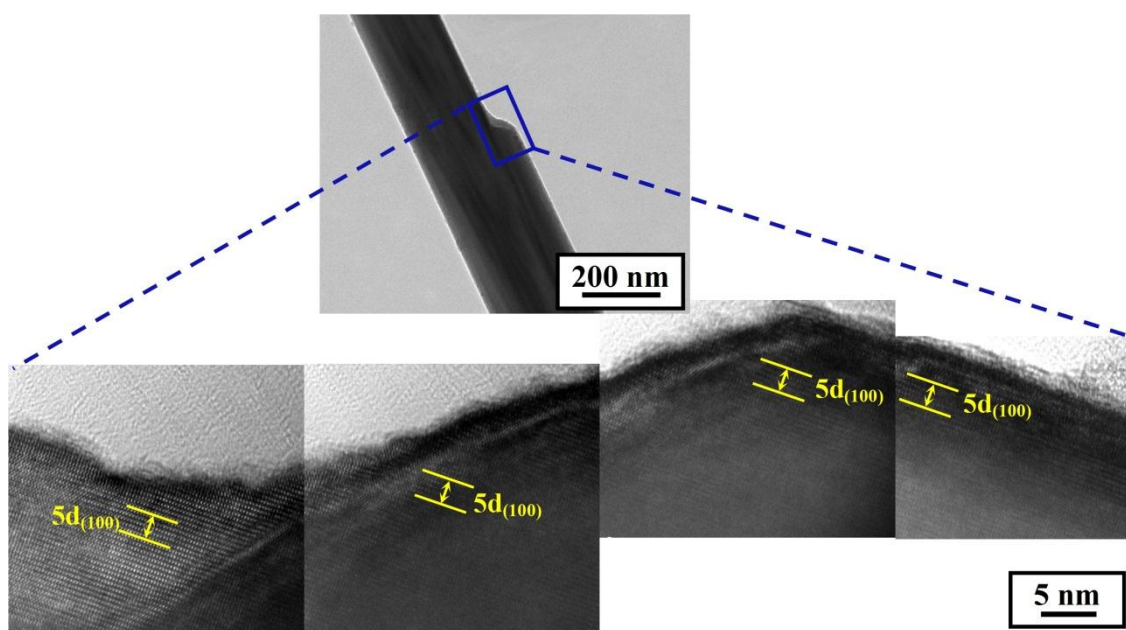


Fig. S2 TEM results for an individual nanowhisker exhibiting a diameter transition.

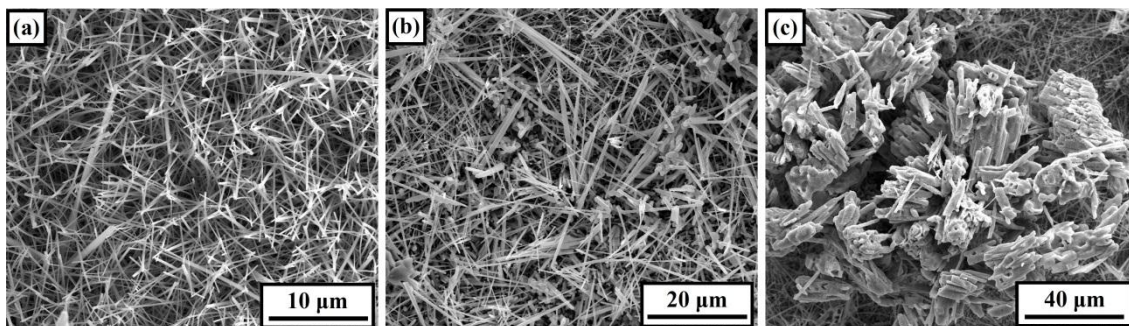


Fig. S3 SEM images of the product fabricated at 950 °C for 4 h with 10 wt% MnO₂. (a) SEM image of the nanowhiskers grown directly on the substrate surface. (b) SEM image of free-standing nanowhiskers. (c) SEM image of the residual manganese oxide bulk structures.

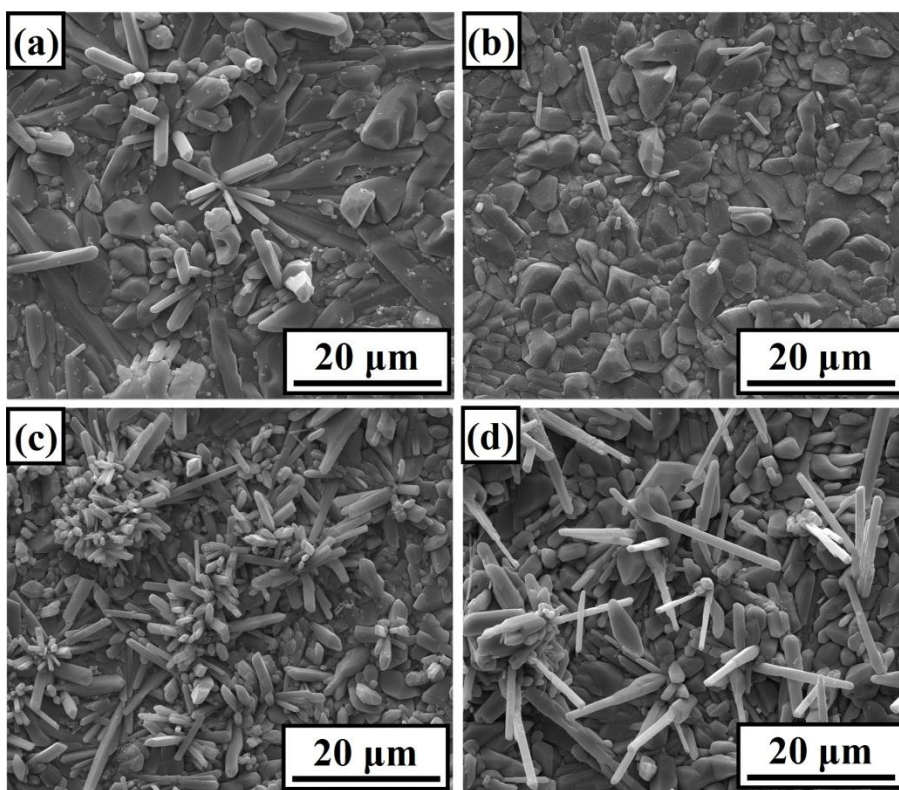


Fig.S4 SEM images of the products fabricated using (a) 3 wt% KClO₃, (b) 3 wt% KCl, (c) 3 wt% K₂SO₄ and (d) 3 wt% NaCl as the agents.

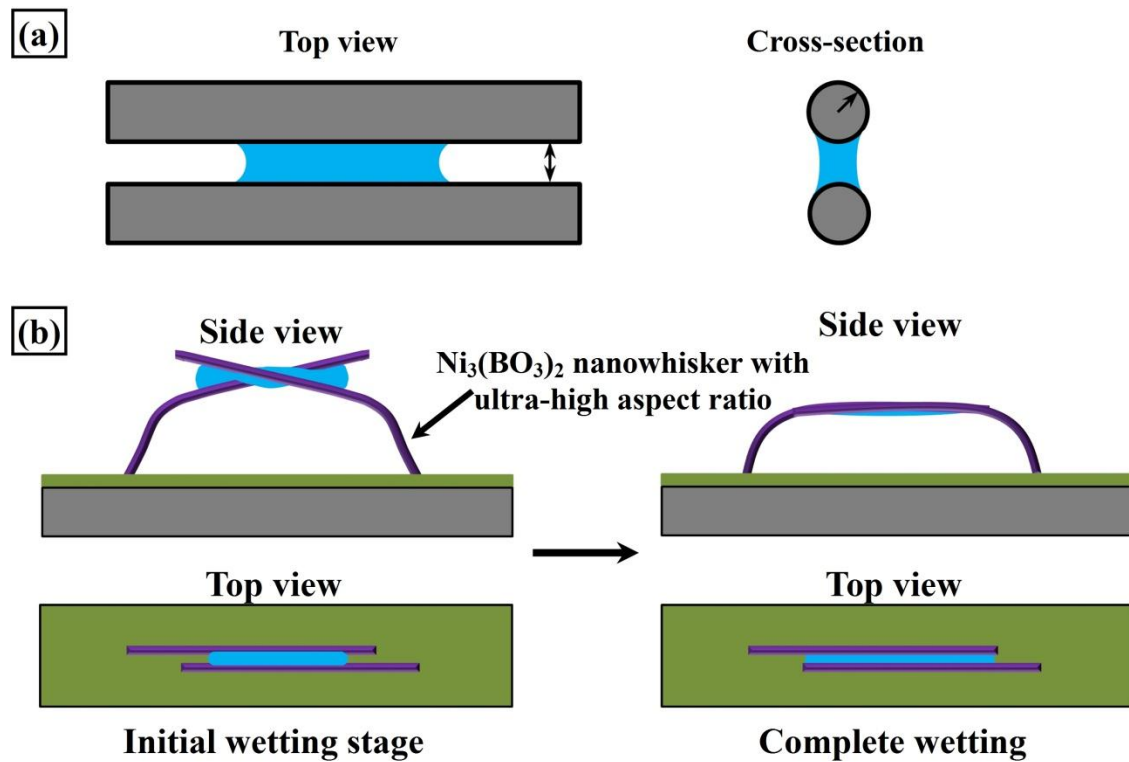


Fig. S5 Schematic illustration of the wetting behavior between two nanowhiskers. (a) Schematic illustration of the basic relation between d_0 and r as defined in Duprat's theory. (b) Schematic illustration of the complete wetting process between two nanowhiskers with ultra-large aspect ratios.