

Electronic Supplementary Information (ESI)

A General Route to Modify Diatomite with Niobates for Versatile Applications of Heavy Metal Removal

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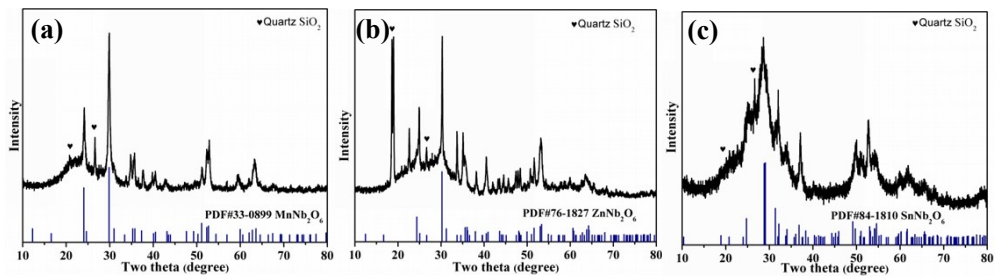


Fig. S1. XRD patterns of the as-prepared (a) MNOD, (b) ZNOD, and (c) SNOD.

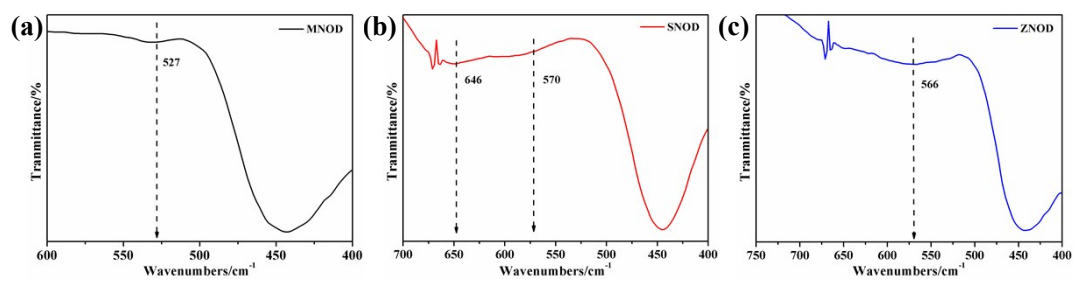


Fig. S2. The detail views of FT-IR spectra (a) MNOD, (b) SNOD, and (c) ZNOD.

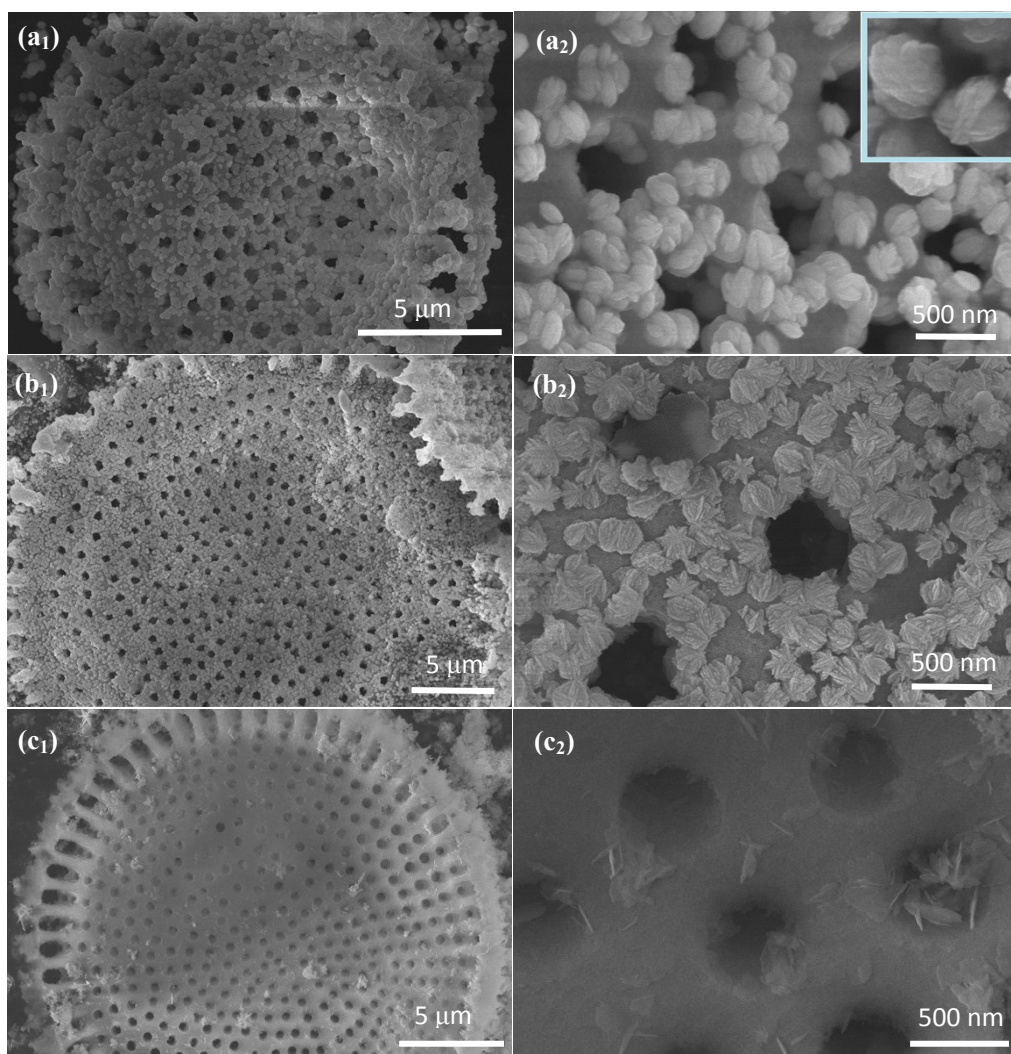


Fig. S3. SEM images of (a₁-a₂) MNOD, (b₁-b₂) ZNOD, and (c₁-c₂) SNOD

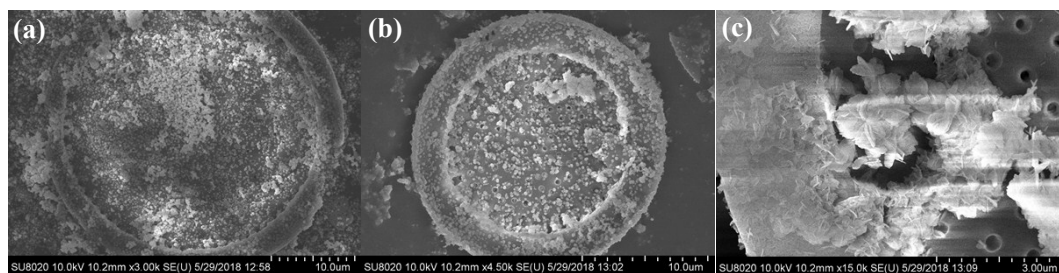


Fig. S4. SEM images of (a) MNOD, (b) SNOD and (c) ZNOD obtained by using RD.

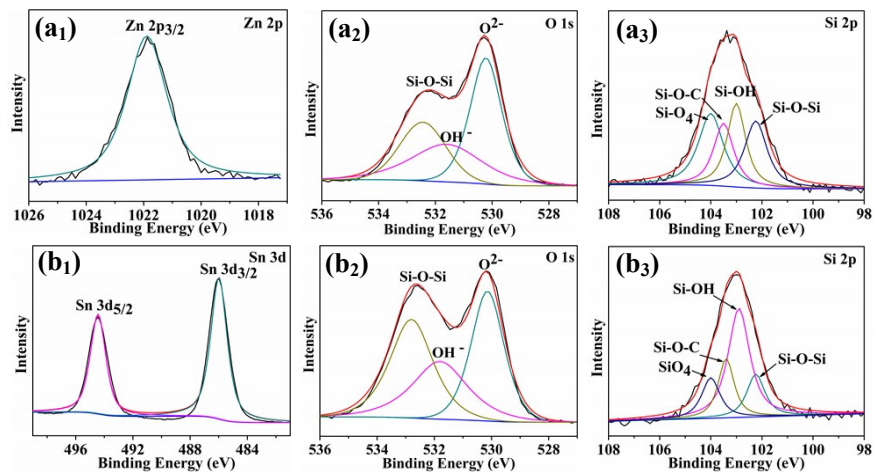


Fig. S5. (a₁-a₃) High resolution XPS scan of Zn 2p (a₁), O 1s (a₂), and Si 2p (a₃) in ZNOD. (b₁-b₃) Sn 3d (b₁), O 1s (b₂), and Si 2p (b₃) in SNOD.

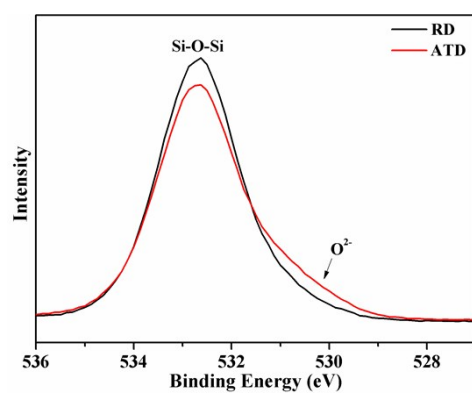


Fig. S6. High resolution XPS scan of O 1s of RD and ATD.

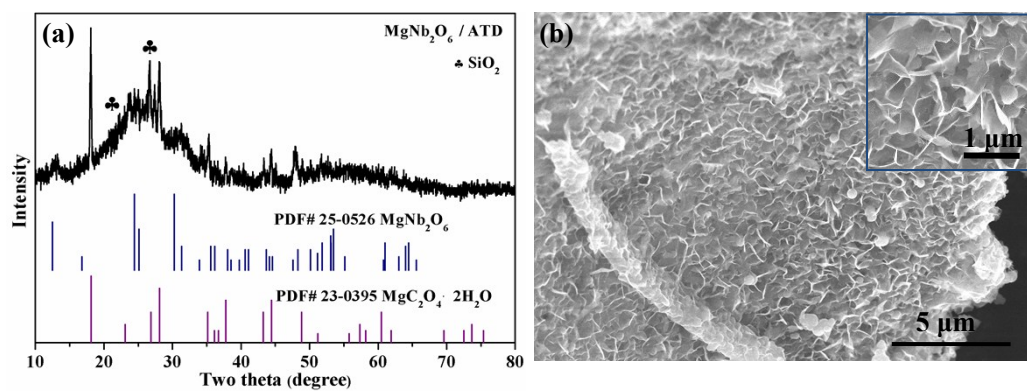


Fig. S7. (a) XRD pattern and (b) SEM images of the as-prepared MgNb_2O_6 on ATD.

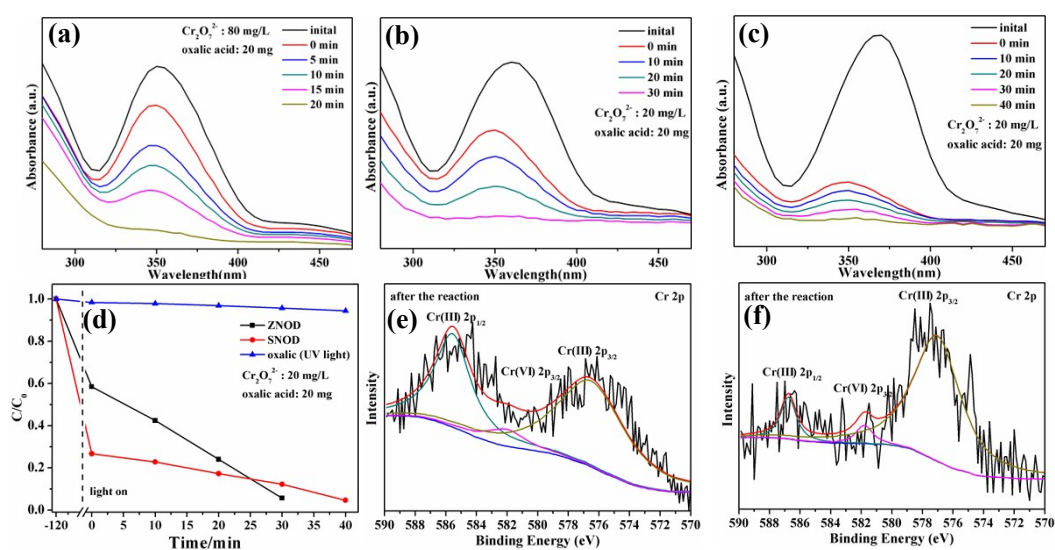


Fig. S8. (a) UV-vis spectra of $\text{Cr}_2\text{O}_7^{2-}$ solution as a function of time using MNOD (20 mg) under natural light irradiation. (b, c) UV-vis spectra of $\text{Cr}_2\text{O}_7^{2-}$ solution treated with (b) ZNOD (20 mg) and (c) SNOD (20 mg) under 300 W xenon lamp with an ultraviolet cutoff filter ($\lambda > 420$ nm) and with a visible-light cutoff filter ($\lambda < 400$ nm), respectively. (d) Comparison of photoreduction performances of ZNOD (UV light), and SNOD (visible light). (e, f) High resolution XPS scan of Cr 2p in (e) SNOD and (f) ZNOD after photoreduction.

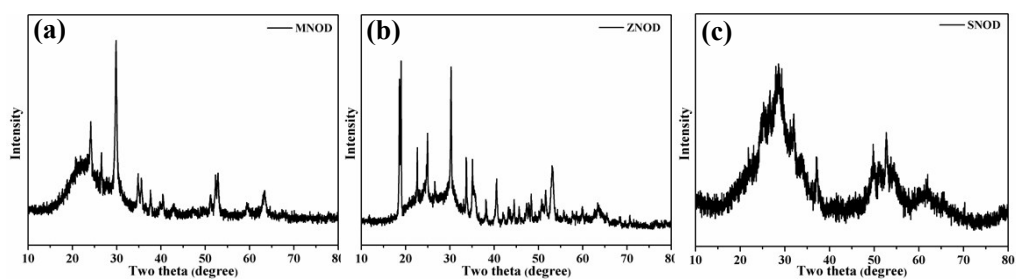


Fig. S9. XRD patterns of (a) MNOD, (b) ZNOD, and (c) SNOD after photoreduction.

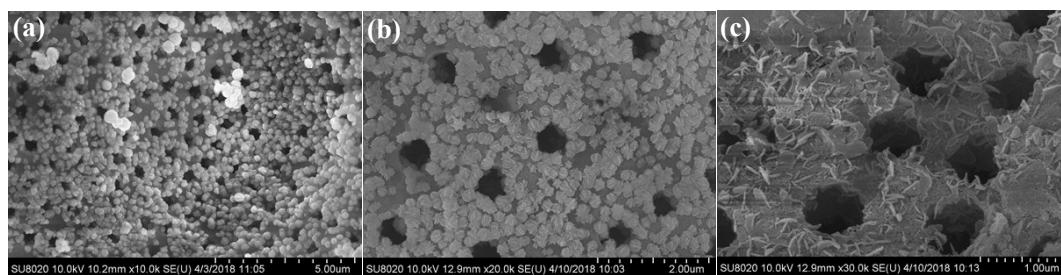


Fig. S10. SEM images of (a) MNOD, (b) ZNOD and (c) SNOD after photoreduction.

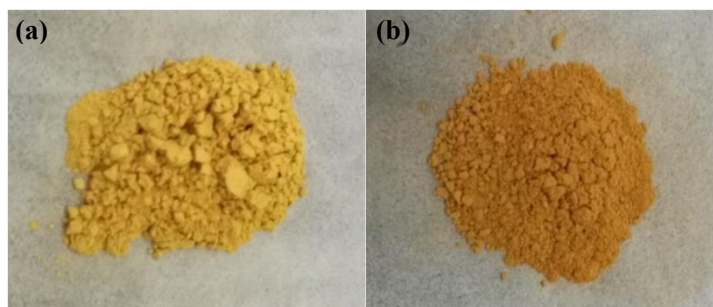


Fig. S11. Optical photographs of MNOD (a) before and (b) after the adsorption of Fe(OH)_3 colloids.

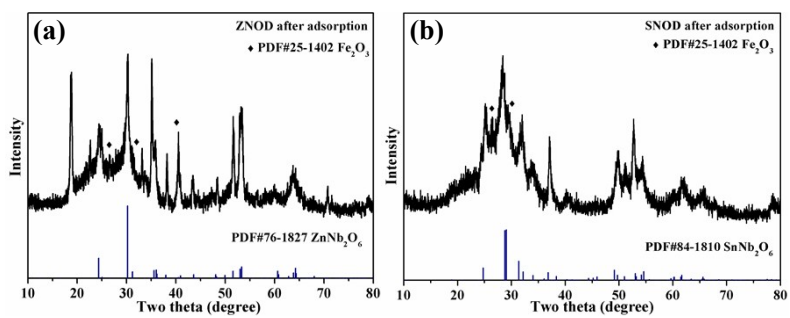


Fig. S12. XRD patterns of (a) SNOD and (b) ZNOD after Fe(OH)₃ colloid adsorption.

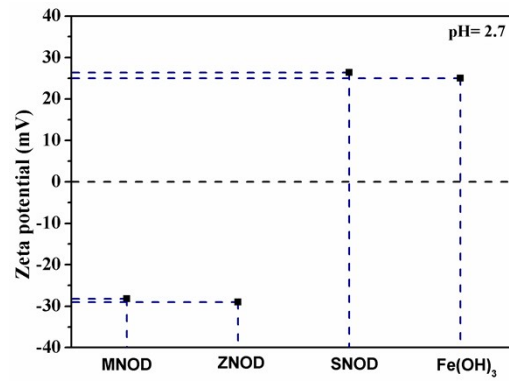


Fig. S13. Zeta potential of MNOD, ZNOD, SNOD and Fe(OH)₃ colloid in aqueous solution with pH= 2.7.

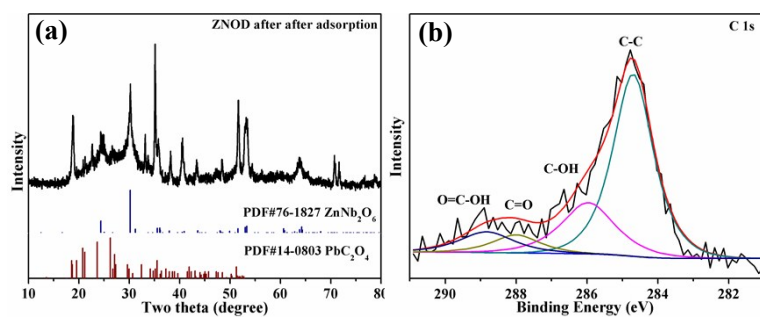


Fig. S14. (a) XRD pattern of ZNOD after Pb(II) adsorption, and (b) C 1s high resolution XPS scan of ZNOD.

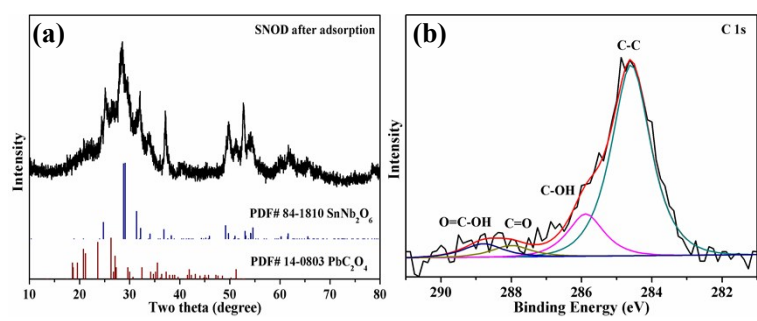


Fig. S15. (a) XRD pattern of SNOD after Pb(II) adsorption, and (b) C 1s high resolution XPS scan of SNOD.

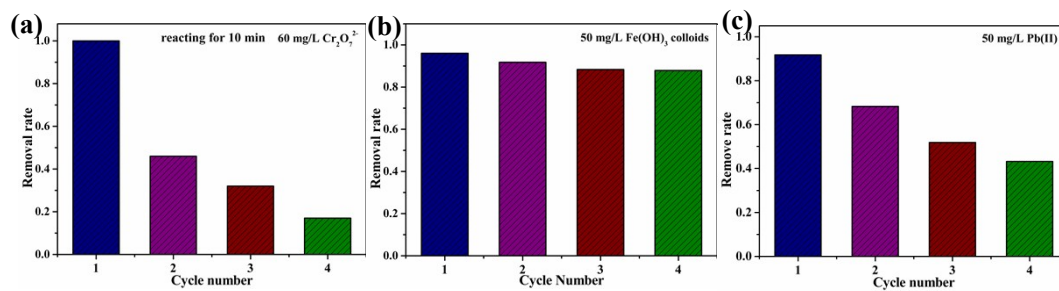


Fig. S16. (a-c) The reusability of MNOD over four cycles for (a) photoreduction of Cr(VI), (b) adsorption of Fe(OH)₃ colloids and (c) adsorption of Pb(II) ions.