Enlargement of Halloysite Clay Nanotube Lumen by Selective Etching of Aluminum Oxide

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Supporting Information for Publication

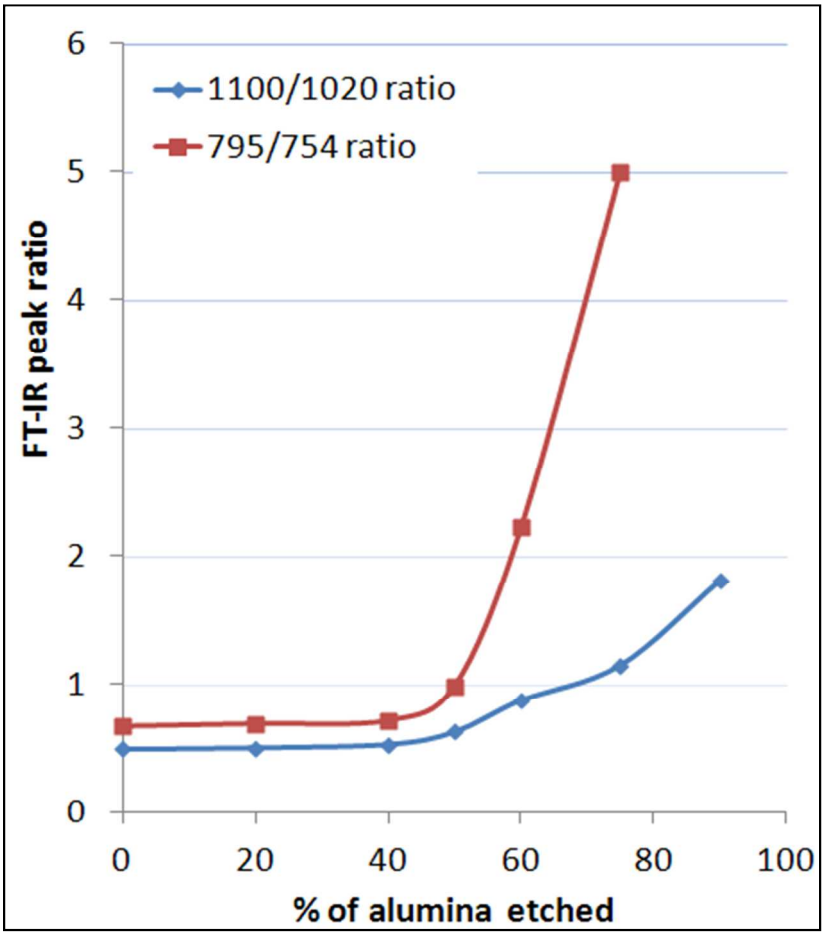


Fig. S1. FT-IR Peak ratios of halloysites at different levels of dealumination

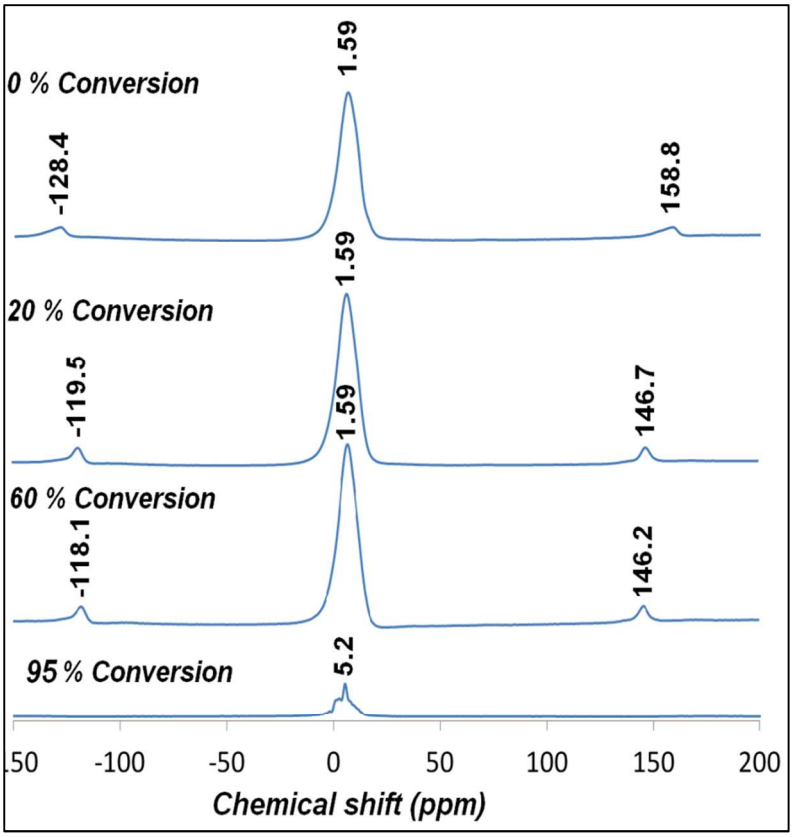


Fig.S2 Solid State ^{27} Al NMR Spectra of halloysite samples at various levels of dealumination by sulfuric acid.

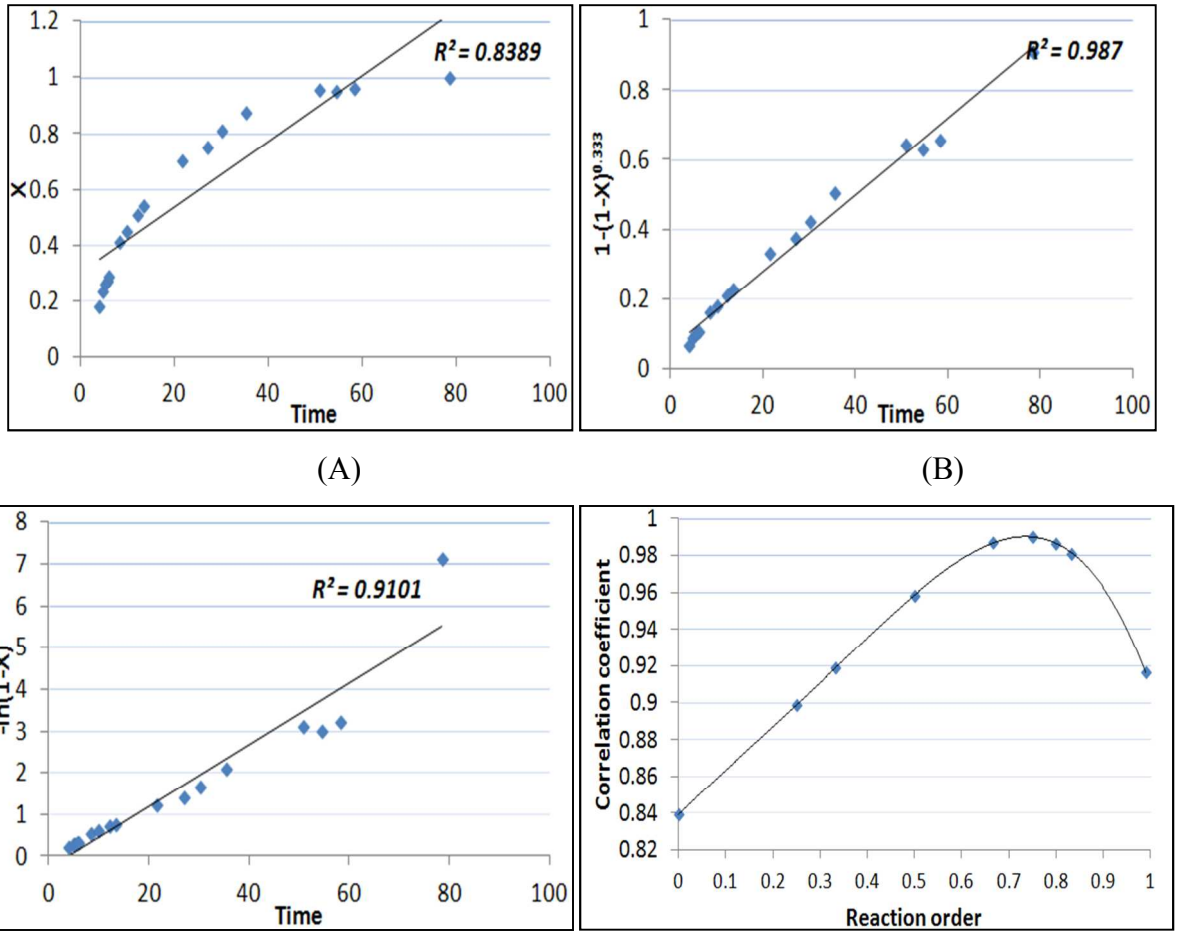
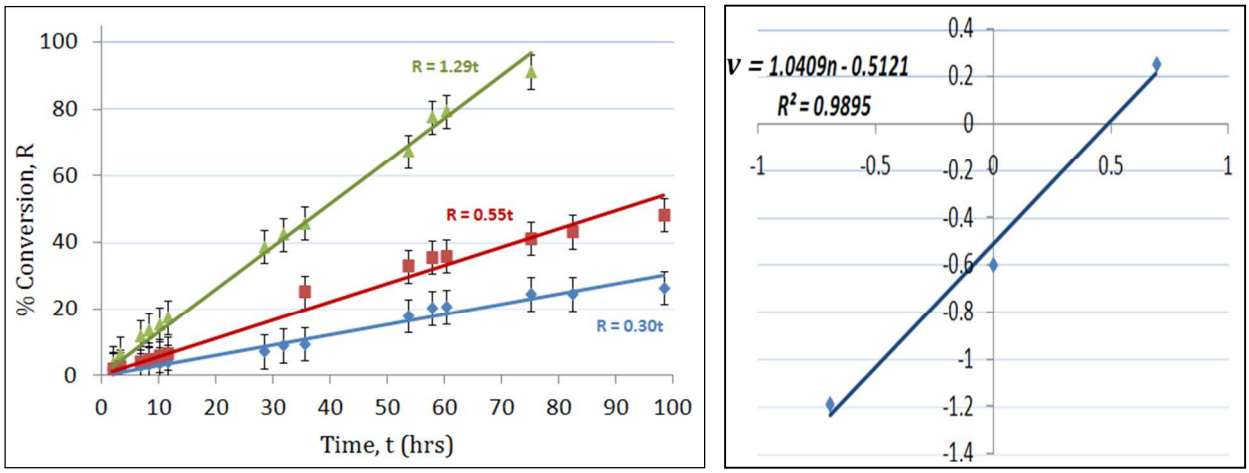


Fig. S3 Kinetic curves of the halloysite dealumination at 80 ˚C fit to the kinetic models of zero[th] (A), 2/3[rd] (B) and first (C) order reaction kinetics. Correlation coefficients of the halloysite dealumination curves at 80˚C fit to the kinetic equations of various orders in aluminum (D). Kinetic profiles were fit to the equation $Kt = 1 - (1 - X)^{1-n}$, where K is the reaction rate constant, X is halloysite dealumination level at time t and n is the reaction order in aluminum. Maximum correlation was observed at value of n = 2/3.



(a) (b)

Fig.S4. (a) Alumina etching curves of halloysites at 50˚C with sulfuric acid of three different concentrations 0.5M (diamonds), 1.0 M(squares) and 2.0M (triangles). (b) $\ln v$ vs $\ln c$ curves of the alumina etching profiles, *v*-reaction rate, *c*-sulfuric acid concentration. As one can see $\ln v = \ln c + C$, i.e. $v = k*c$

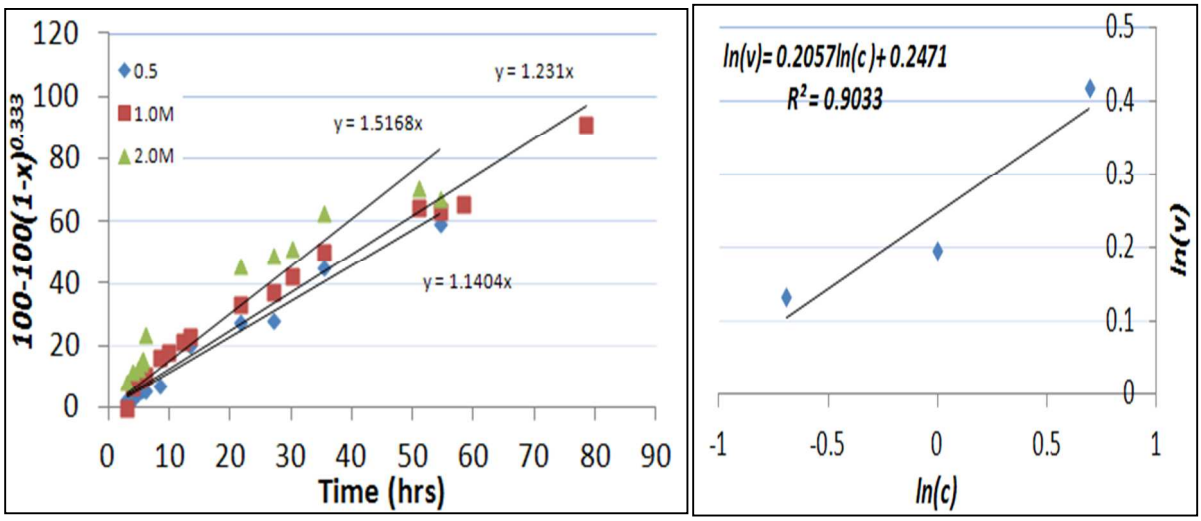


Fig S5. (a) Alumina etching curves of halloysites at 80˚C with sulfuric acid of three different concentrations 0.5M (diamonds), 1.0 M(squares) and 2.0M (triangles). (b) $\ln v$ vs $\ln c$ curves of the alumina etching profiles, *v*-reaction rate, *c*-sulfuric acid concentration. As one can see $\ln v = 0.2 \ln c + C$, i.e. $v = k*c^{0.2}$

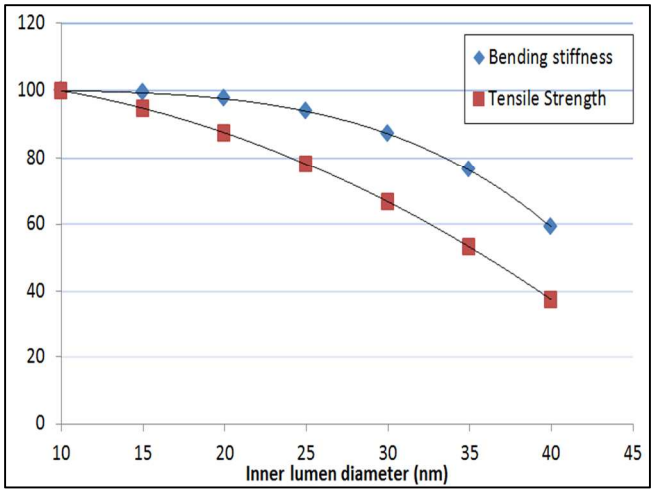


Fig. S6a. Relative values of halloysite bending stiffness and tensile strength (normalized to 100) at various lumen diameters.

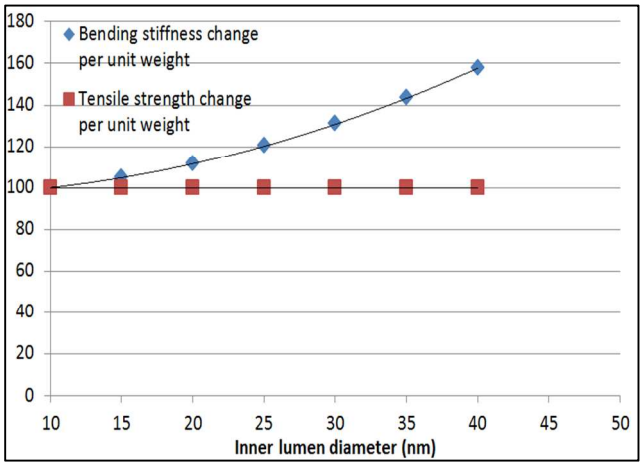


Fig. S6b. Relative values of halloysite bending stiffness and tensile strength per unit weight (normalized to 100) at various lumen diameters.