surfaces

Supplementary Materials:

Ternary Metal-Alginate-Chitosan Composites for Controlled Uptake of Methyl Orange

Bernd G. K. Steiger and Lee. D. Wilson *

Department of Chemistry, University of Saskatchewan, 110 Science Place, Thorvaldson Building, Saskatoon, SK S7N 5C9, Canada
* Correspondence: lee.wilson@usask.ca; Tel.: +1-306-966-2961

Material Synthesis

Controlling the pH conditions during the neutralization step appeared to be crucial for the composite formation. The formation of metal oxides and their subsequent precipitation should be avoided.

Figure S1. Visual difference between the prepared materials with careful (left) neutralization step for successful materials preparation vs. metal oxide precipitation and lack of metal incorporation into the framework (right).

Adsorption Experiments

Figure S2. After the kinetics study (C_0 ca. 230 mg/L), where 100 mg material were submerged in 250 mL solution. No filter was used to get the optimum performance; withdrawal of material was negligible.

Figure S3. Adsorption isotherm studies with methyl orange. Starting solutions in the foreground while Al-TMC-N and Cu-TMC-N (Fe-TMC-N not shown for clarity and lack in visual difference) are after adsorption. Solutions from 10-1000 mg/L were tested.

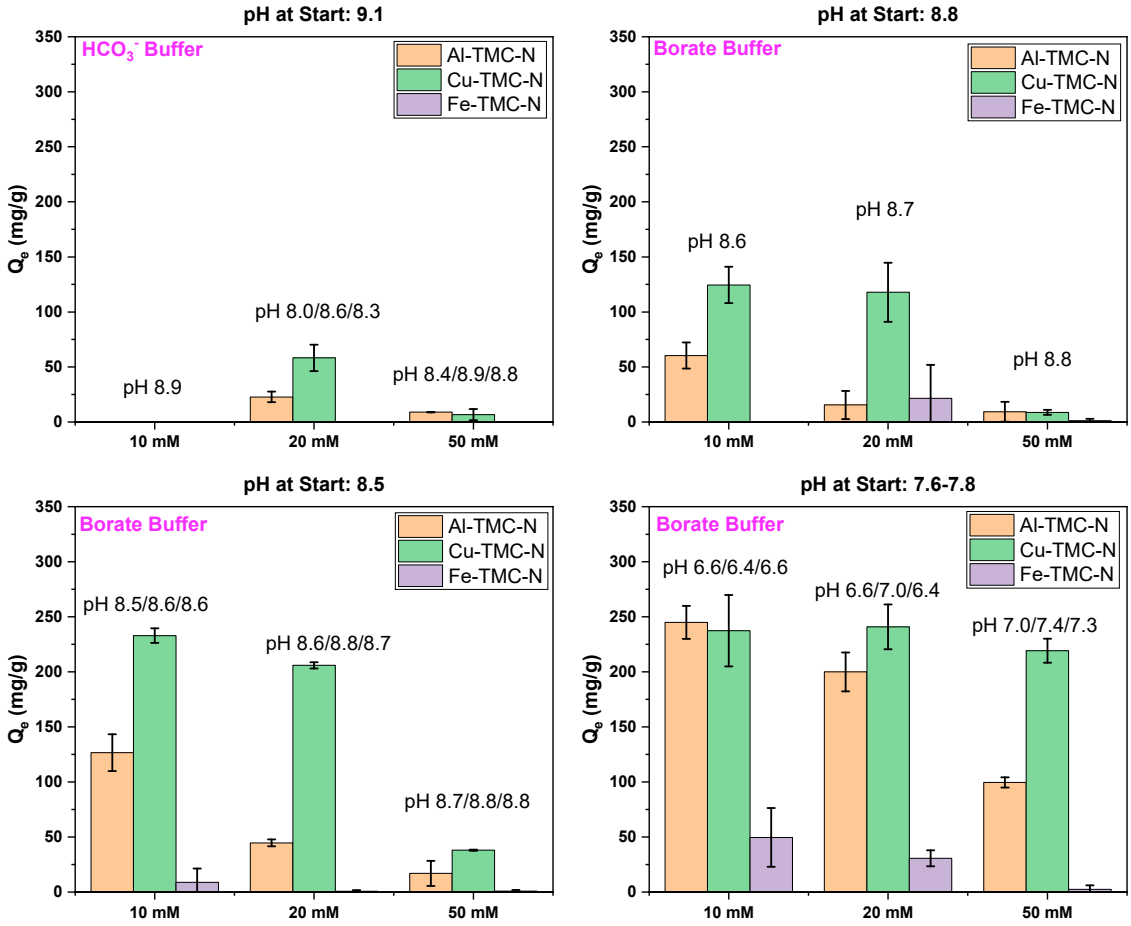

Figure S4. Adsorption of MO in borate buffer solutions of varying strength (10-50 mM) and carbonate buffer (10-50 mM) with determined pH before adsorption and after adsorption (see inset in each graph).

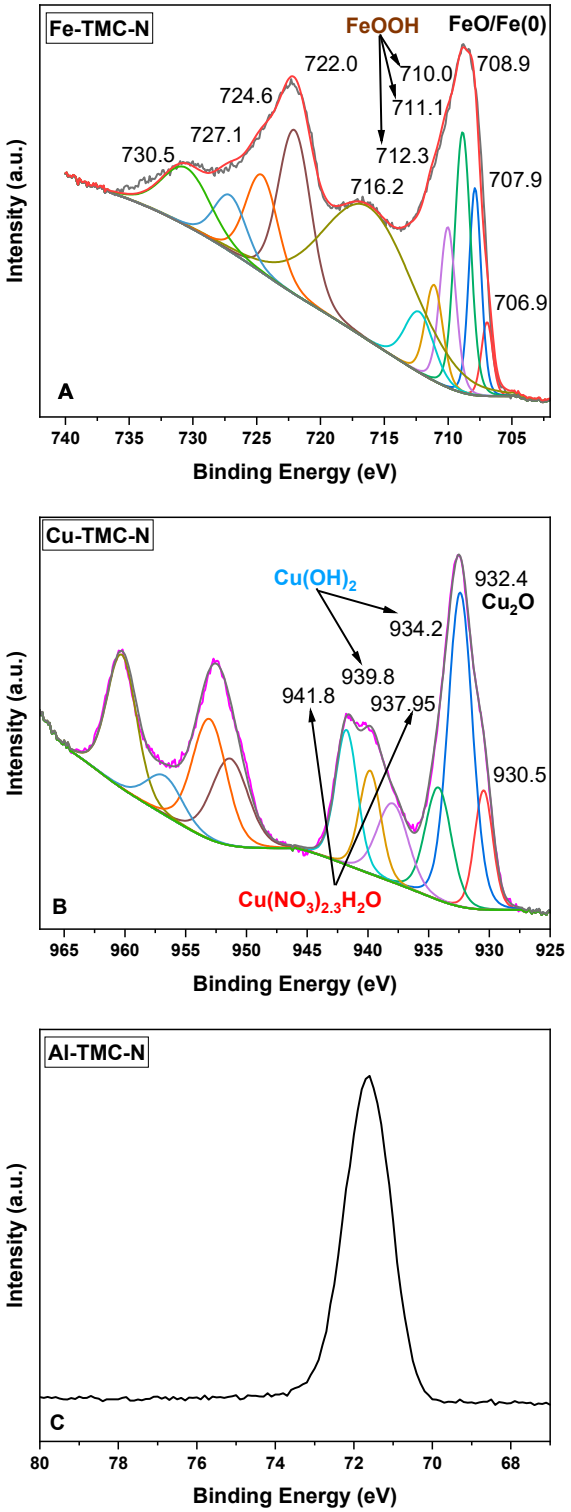

Figure S5. XPS narrow scan of Fe $2p_{3/2}$ (A), Cu $2p_{3/2}$ (B) and Al $2p_{3/2}$ (C).

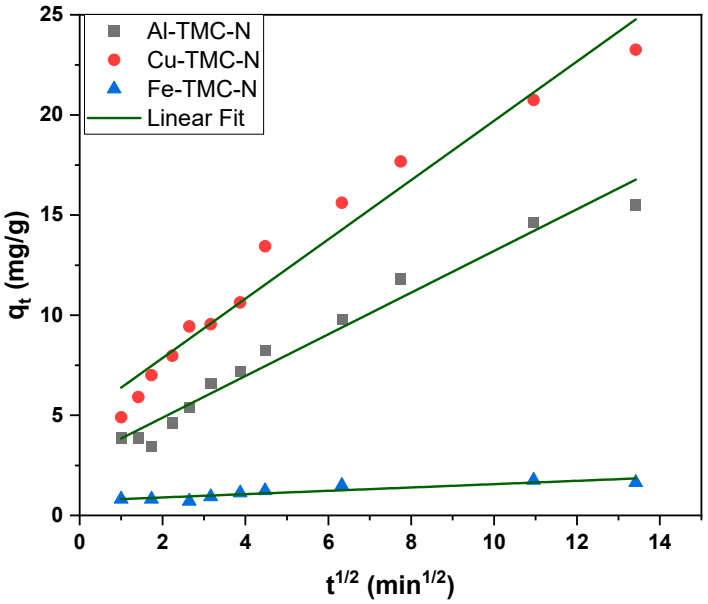

Figure S6. Single linear fit and intraparticle diffusion model of the three TMC materials.

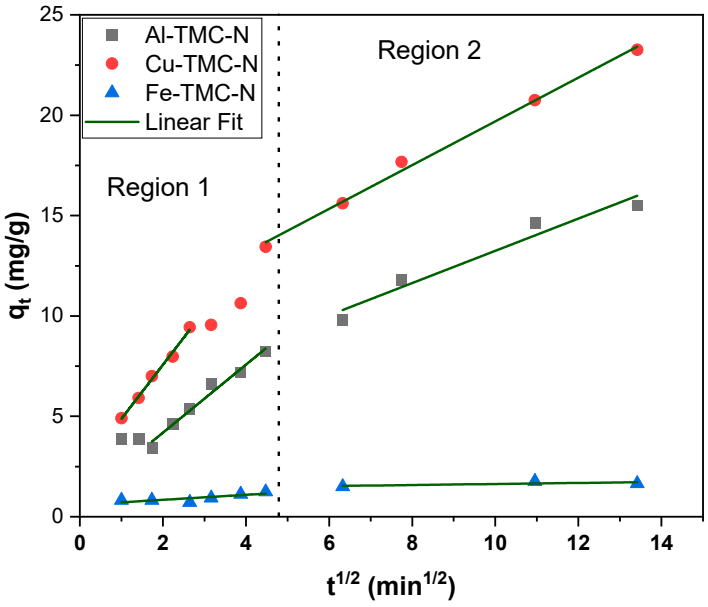

Figure S7. Linear Fit of two regions and intraparticle diffusion model of all three TMC materials.

Table S1. Intraparticle diffusion model according to Weber and Morris for all three materials and MO adsorption kinetics.

	One single Fit			Region 1			Region 2		
	C	k	R^2	C	k	R^2	C	k	R^2
Al-TMC-N	2.8 ± 0.4	1.04 ± 0.06	0.97	0.8 ± 0.4	1.7 ± 0.1	0.98	5.2 ± 1.3	0.8 ± 0.1	0.95
Cu-TMC-N	4.9 ± 0.6	1.48 ± 0.09	0.97	2.2 ± 0.3	2.7 ± 0.4	0.99	8.8 ± 0.4	1.09 ± 0.04	0.99
Fe-TMC-N	0.73 ± 0.09	0.08 ± 0.01	0.83	0.6 ± 0.1	0.12 ± 0.04	0.66	1.4 ± 0.3	0.03 ± 0.03	0.50

Table S2. Freundlich isotherm parameters for all three TMC materials.

	Al-TMC-N	Cu-TMC-N	Fe-TMC-N
K_f	63 ± 16	60 ± 18	13 ± 1
n	3.0 ± 0.4	2.8 ± 0.4	4.4 ± 0.4
R^2	0.75	0.75	0.95

Table S3. Sips isotherm parameters for all three TMC materials.

	Al-TMC-N	Cu-TMC-N	Fe-TMC-N
q (mg/g)	410 ± 14	452 ± 86	41.6 ± 0.9
n	1.5 ± 0.1	1.2 ± 0.4	1.4 ± 0.4
K_a	0.71 ± 0.06	2.1 ± 1.6	0.20 ± 0.02
R^2	0.99	0.89	0.98