

Inorganic Modification of Cellulosic Fibers for Enhanced Oil Sorption Capacity

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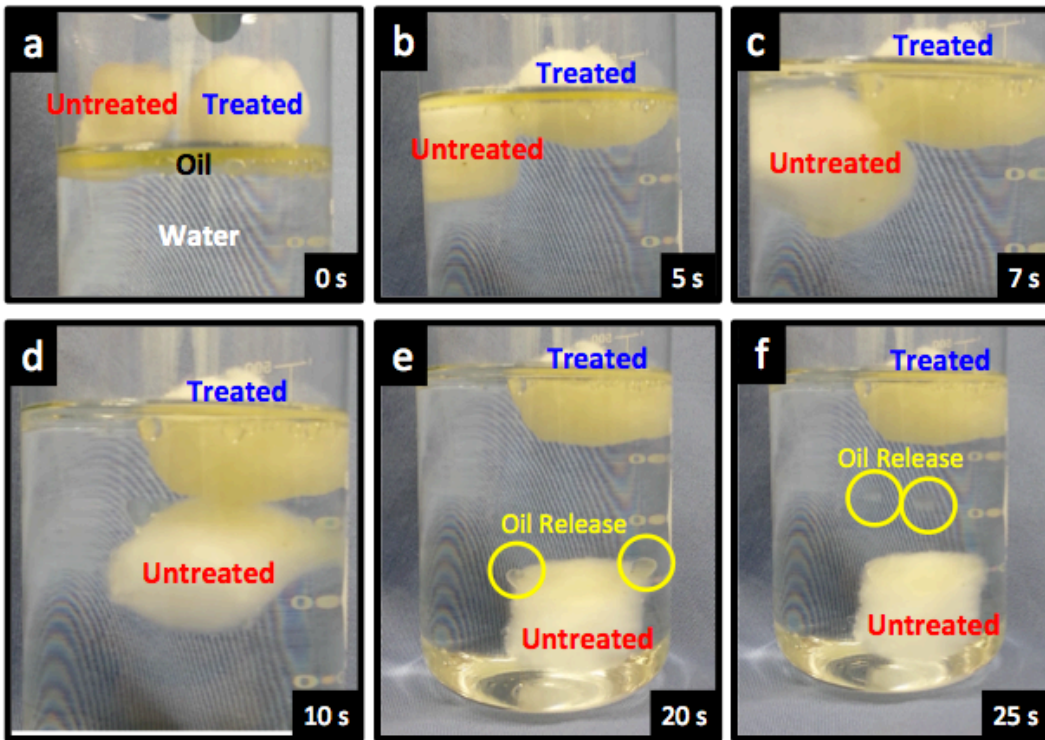


Figure 1. Treated vs. untreated cotton ball on a “thin” film of oil. Note how the untreated ball preferentially soaks up water, even releasing oil once submerged.

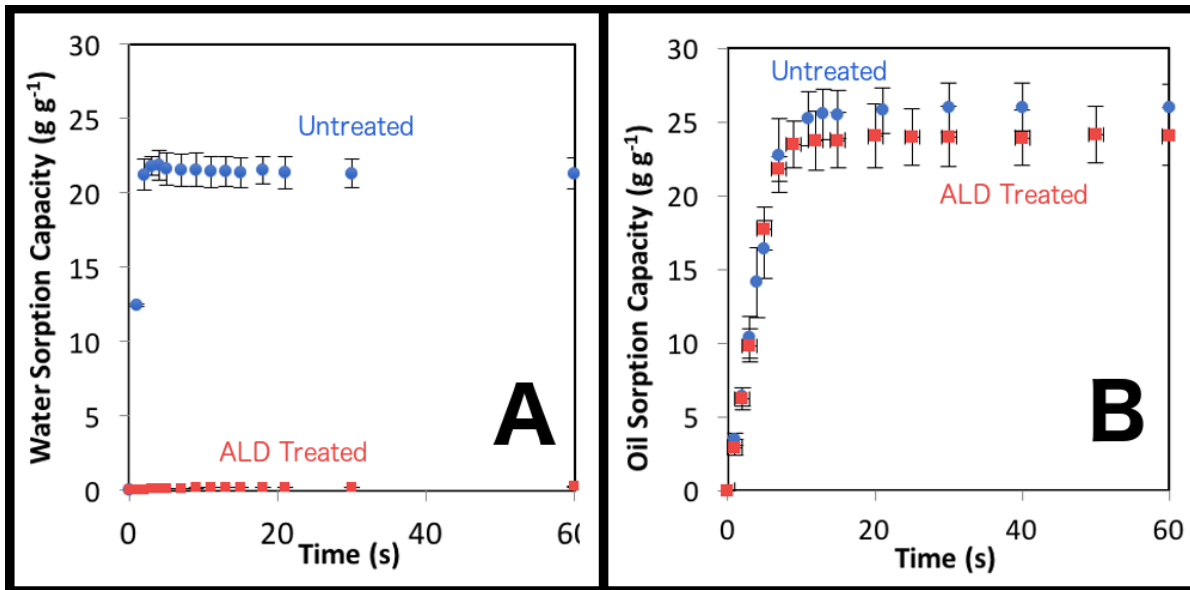


Figure 2. (A) Water sorption kinetics data for untreated and ALD treated cotton placed in pure water. (B) Oil sorption kinetics data for untreated and ALD treated cotton in placed in pure canola oil.

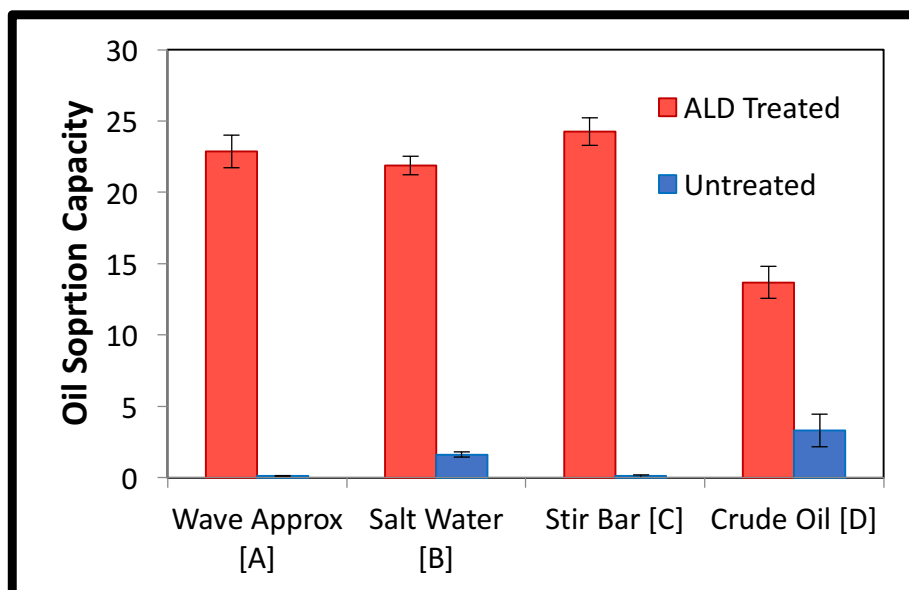


Figure 3. Oil sorption capacity for untreated and treated cotton when exposed to oil/water mixtures of various experimental conditions, including turbulence and dissolved electrolytes.

Table 1. Comparison of different methods of quantifying sorption capacity, either on a per-mass or per-volume basis.

Sorbent Type	Sorption Capacity (by mass) (g g ⁻¹)	Sorption Capacity (by volume) (g cm ⁻³)	Reference
MTMS-coated Microfibrillated Cellulose	190	1.40	1
Nitrogen Doped Graphene Framework	460	0.96	2
Cellulose coated via ALD of Al ₂ O ₃	28	0.84	This work
Magnetic Polystyrene Foam	18	0.80	3
TMCS-coated Bacterial Cellulose Aerogel	120	0.80	4
Polyurethane foam ALD coated with Al ₂ O ₃ and Silanized	33	0.74	5
CMB Aerogel	130	0.74	6
Nanocellulose Aerogel ALD coated with TiO ₂	90	0.68	7
MTMS-coated Cellulose Aerogel	95	0.67	8
Polyimide foam ALD coated with Al ₂ O ₃ and Silanized	89	0.60	5