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Supporting Information

for

Mechanochemical amorphization of chitin: impact of apparatus material on performance and contamination

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Additional experimental data and spectra

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Ball parameters

Table S1: Vickers Hardness and exact mass of 2 g ball series, standard deviation of 0.237 across all ball masses.

jar type	*Vickers hardness (MPa)*	*total ball mass (g)*
PTFE	30	2.3344
PMMA	170	2.4588
Al	196	1.8319
Cu	369	1.9337
Brass	813	2.2216
SS	2000	2.0595
WC	6080	2.4378
ZrO_2	10,000	2.0112

Study of chitin amorphization as a function of SS ball size and mass

Table S2: Parameters of the balls used in the SS ball size and mass comparison, as well as CrI(%) of chitin milled with them (1 ball, 30 min milling).

Ball Size (diameter, mm)	Ball Mass	Depth @ 30% (mm)	Diameter at depth (mm)	Area of contact at depth (mm^2)	Mass/area (mg/mm^2)	CrI (%)
5.53	0.7055	1.659	5.06	28.76	24.5	34.2
6.97	1.3669	2.091	6.39	45.81	29.8	29
7.8	2.061	2.34	7.15	57.35	35.9	27
9.5	3.464	2.85	8.71	85.1	40.7	24.3
10	4.018	3	9.16	94.17	42.6	22.4
12.64	8.4162	3.792	11.56	150.13	56.1	19.8
14.28	11.71	4.284	13.09	192.23	60.9	17.8

X-ray photoelectron spectroscopy

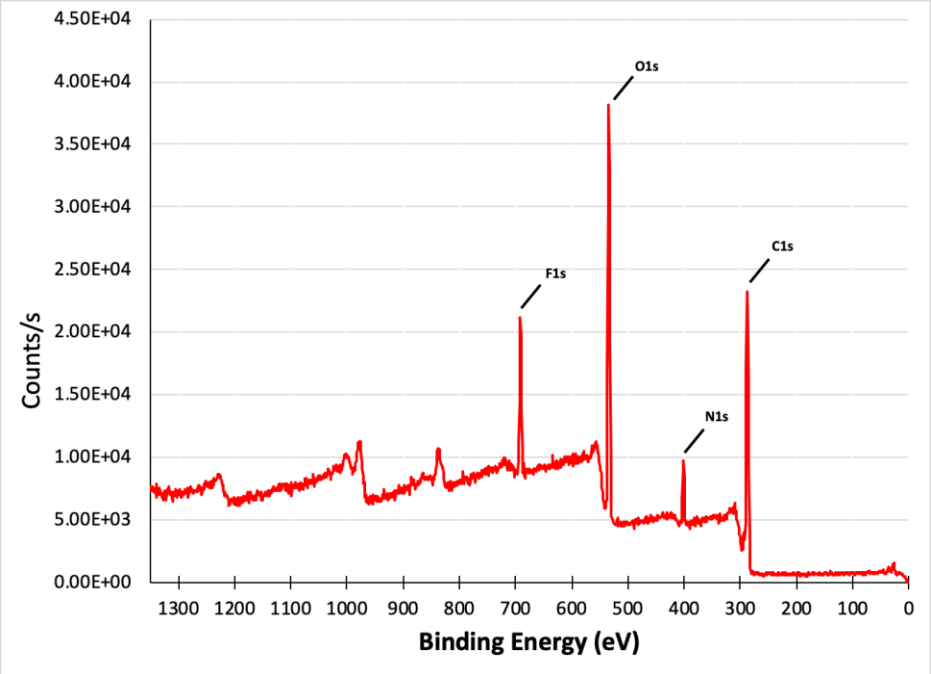

Figure S1: XPS spectrum of chitin milled in PTFE jar with one 10 mm ZrO_2 ball, milling time 30 min.

Powder X-ray diffraction

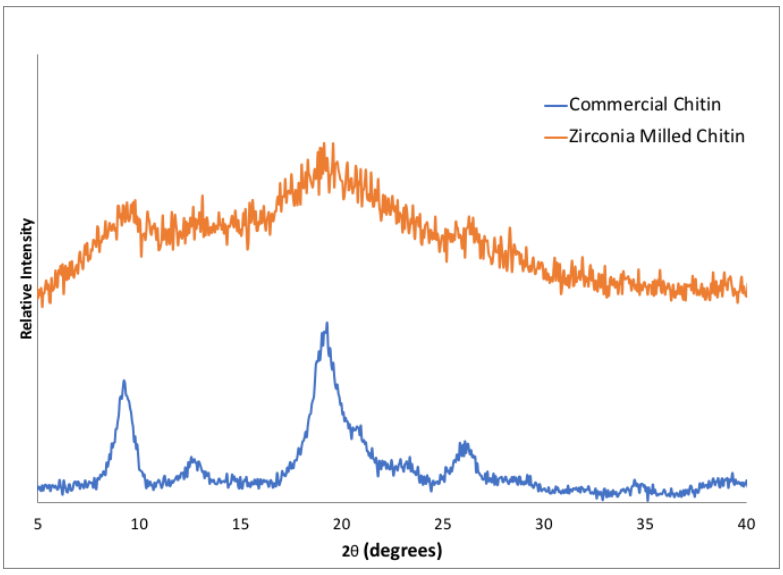

Figure S2: PXRD of biomass, from bottom to top, commercial chitosan (not milled), ZrO_2 milled chitin.

Fourier transform infrared spectroscopy

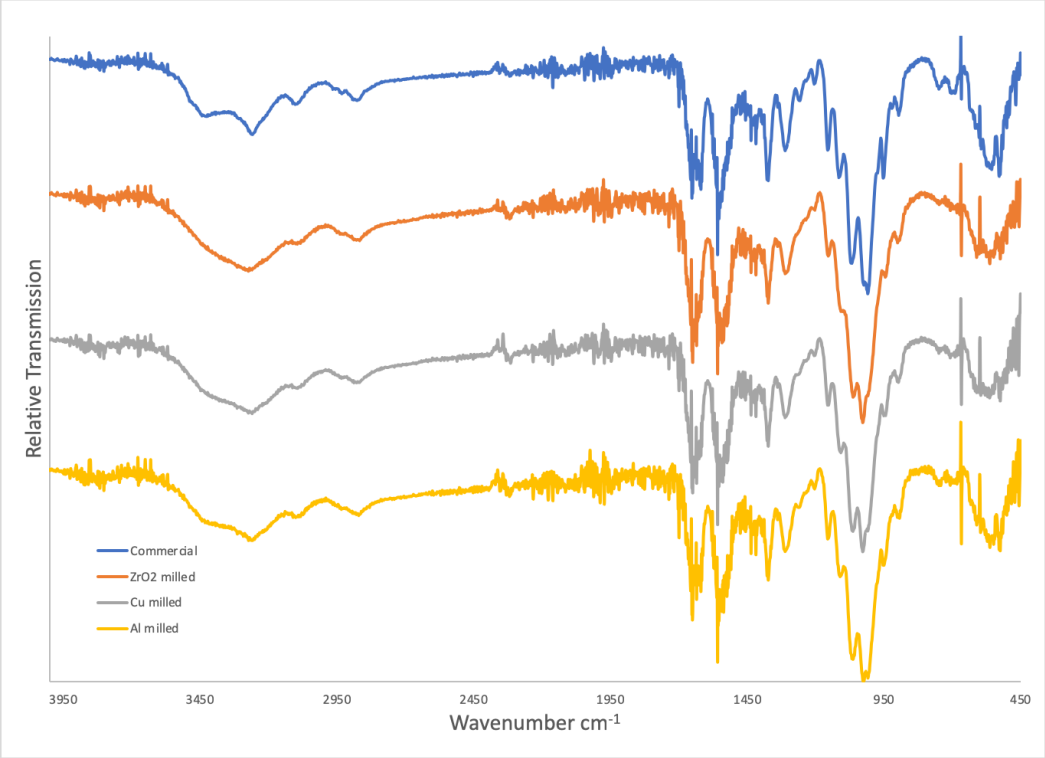

Figure S3: ATR–FTIR of chitin samples commercial chitin, pre and post milling in aluminum, copper, and zirconia.

Milled sample picture showing discoloration

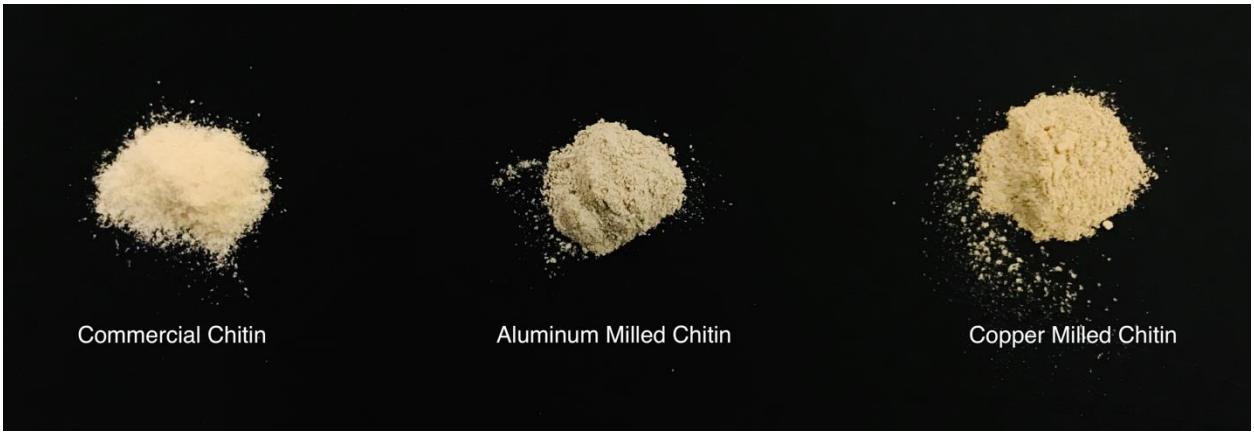

Figure S4: Chitin samples from left to right, commercial chitin (not milled), chitin milled in aluminum jar and ball (30 min, 29.5 Hz), chitin milled in copper jar and ball (30 min, 29.5 Hz).

Figure S5: Chitin samples from left to right, chitin milled in zirconia, chitin milled in stainless steel jar and ball (30 min, 29.5 Hz), chitin milled in brass jar and ball (30 min, 29.5 Hz).