Electronic Supplementary Material (ESI) for RSC Sustainability.

Extraction of Cellulose from Restaurant Food Waste

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Keywords: cellulose, biopolymers, extraction, food waste, pomace.

Supplementary Material

Tables

Supplementary Table S1: List of fruits and vegetables on the menu for the I Love Juice Bar®

Fruits:	Vegetables:
acai	basil
apple	beets
avocado	bell pepper
banana	carrot
blueberry	celery
cucumber	chickpeas
lemon	corn
mango	ginger
orange	kale
pineapple	lentils
strawberry	mint
tomato	parsley
zucchini	spinach
	squash
	wheatgrass

Supplementary Table S2: Yields of extracted cellulose – Mixed food waste on average yielded 4.41% cellulose utilizing the acid/base procedure.

Experimental Run:	Weight of Food	Weight of Extracted	Yield:

	Waste:	Sample:	
1	300.00 g	12.20 g	4.01%
2	300.01 g	10.79 g	3.60%
3	300.29 g	10.90 g	3.63%
4	300.28 g	13.75 g	4.58%
5	300.51 g	15.97 g	5.32%
6	300.03 g	15.95 g	5.32%

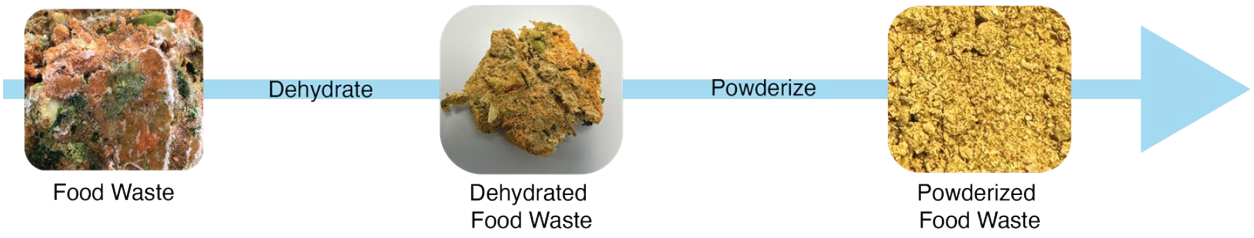
Supplementary Table S3: Determination of Viscosity from Ubbelohde Viscometer - Viscosity values determined for 0.5 wt% control and 0.5 wt% extracted cellulose in 50 mL of 0.5 M Cupriethylenediamine (CED) solution. The concentration of the solution was 0.005 g/mL.

Sample:	Kinematic Viscosity (cP):	Relative Viscosity:	Specific Viscosity:	Intrinsic Viscosity (mL/g):	Density (g/cm^3):
Control Cellulose Solution	1.798 ± 0.019	1.234	0.234	43.562	1.055
Extracted Cellulose Solution	1.687 ± 0.066	1.046	0.046	9.074	1.055
0.5 M CED Soltuion	1.463 ± 0.019				1.052

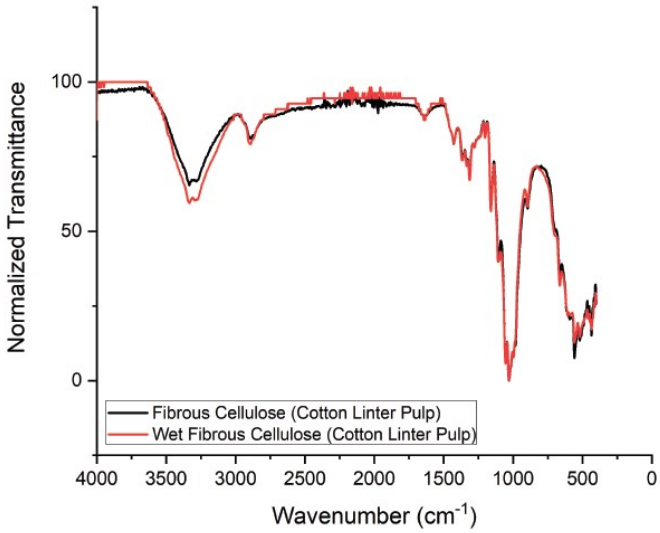
Supplementary Table S4: Crystallinity index of the cellulose samples by X-ray Diffraction & mean size of ordered crystalline domains.

Sample	CrI (%)	FWHM (rad)	τ (Å)
Microcrystalline Control	61	0.035	45.0
Fibrous Control	61	0.021	75.2
Extracted Cellulose	16	0.024	64.4

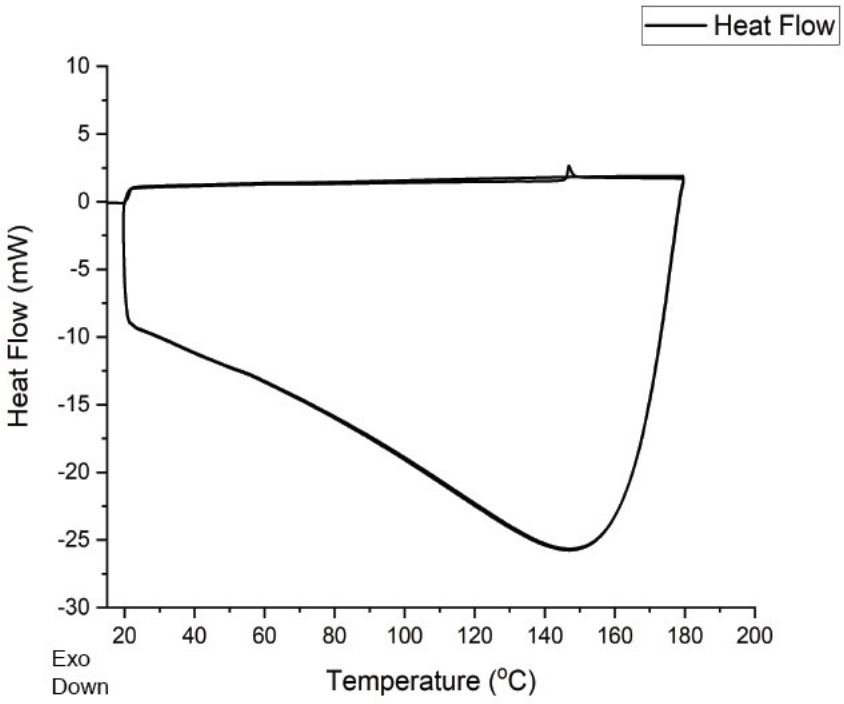
Figures



Supplementary Figure 1: Approximately 50 lbs of an assortment of fruit and vegetable waste was collected from a local restaurant and processed for the extraction of biopolymers. After collection, the food waste was dehydrated for approximately 14 hours, prior to being pulverized into a powder for use in the acid/base extraction procedure.



Supplementary Figure 2: FTIR Spectroscopy was performed on both a dry cellulose and wet cellulose sample that had been air-dried. The main difference between the two samples can be observed at the 3300 cm^{-1} peak with difference in stretching vibrations. This is due to the presence of -OH groups from water molecules.



<u>Supplementary Figure 3</u>: DSC of Cellulose from Mixed Food Waste – DSC was performed on the extracted cellulose sample to determine the glass transition temperature with a heat/cool/heat cycle from 20-180ºC at a 5ºC/min ramp.