

Forming Micro-and Nano-Plastics from Agricultural Plastic Films for Employment in Fundamental Research Studies

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Materials

Name	Company	Catalog Number	Comments
Aluminum dish, 150 mL	Fisher Scientific, Waltham, MA, USA	08-732-103	Drying of collected NPs
Aluminum dish, 500 mL	VWR International, Radnor, PA, USA	25433-018	Collecting NPs after wet-grinding
Centrifuge	Fisher Scientific, Waltham, MA, USA	Centrifc 228	Container for centrifugation
Delivery tube, #20, 840 µm	Thomas Scientific, Swedesboro, NJ, USA	3383M30	Sieving of the first fraction during milling
Delivery tube, #60, 250 µm	Thomas Scientific, Swedesboro, NJ, USA	3383M45	Sieving of the second fraction (3x) during milling
Thermomixer, 5350 Mixer	Eppendorf North America, Enfield, CT, USA	05-400-200	Analysis of sieving experiments
FT-IR Spectrum Two, spectrometer with attenuated total reflectance (ATR)	Perkin Elmer, Waltham, MA, USA	L1050228	Measuring FTIR spectra
Glass beaker, 1000 mL	DWK Life Sciences, Milville, NJ, USA	02-555-113	Stirring of MPs-water slurry before grinding
Glass front plate	Thomas Scientific, Swedesboro, NJ, USA	3383N55	Front cover plate for Wiley Mini Mill
Glass jar, 50 mL	Uline, Pleasant Prairie, WI, USA	S-15846P	Collective MPs after milling
Glove Box, neoprene	Bel-Art-SP Scienceware, Wayne, NJ, USA	BEL-H500290000	22-Inch, Size 10
Zetasizer Nano ZS 90 size analyzer	Malvern Panalytical, Worcestershire, UK	Zetasizer Nano ZS	Measuring nanoplastics dispersed in DI-water
Microscope camera	Nikon, Tokyo, 108-6290, Japan	Nikon Digital Sight 10	Combined with Olympus microscope to receive digital images
Microscope	Olympus, Shinjuku, Tokyo, Japan	Model SZ 61	Imaging of MPs
Nitrogen jar, low form dewar flasks	Cole-Palmer, Vernon Hills, IL, USA	UX-03771-23	Storage of liquid nitrogen during cryogenic cooling

Accurate Blend 200, 12-speed blender	Oster, Boca Raton, FL, USA	6684	Initiating the size reduction of cryogenically treated plastic film
PBAT film, - BioAgri™ (Mater-Bi®)	BioBag Americas, Inc, Dunedin, FL, USA	0.7 mm thick	Feedstock to form MPs and NPs, agricultural mulch film
PBAT pellets	Mobius, LLC, Lenoir City, TN, USA	Diameter 3 mm	Feedstock to form microplastics (MPs) and nanoplastics (NPs) through milling and grinding
Plastic centrifuge tubes, 50 mL	Fisher Scientific, Waltham, MA, USA	06-443-18	Centrifugation of slurry after wet-grinding
Plastic jar, 1000 mL, pre-cleaned, straight sided	Fisher Scientific, Waltham, MA, USA	05-719-733	Collection of NPs during and after wet grinding
Polygon stir bars, diameter=8 mm, length=50.8 mm	Fisher Scientific, Waltham, MA, USA	14-512-127	Stirring of MPs slurry prior to wet-grinding
Scissors, titanium bonded	Westcott, Shelton, CT, USA	13901	Cutting of initial PBAT film feedstocks
Square glass cell with square aperture and cap, 12 mm O.D.	Malvern Panalytical, Worcestershire, UK	PCS1115	Measuring of NPs particle size
Stainless steel bottom, 3 inch, pan	Hogentogler & Co. Inc, Columbia, MD, USA	8401	For sieving after Wiley-milling
Stainless steel sieve, 3 inch, No. 140 (106 µm)	Hogentogler & Co. Inc, Columbia, MD, USA	1308	For sieving after Wiley-milling
Stainless steel sieve, 3 inch, No. 20 (850 µm)	Hogentogler & Co. Inc, Columbia, MD, USA	1296	Sieving of MPs after Wiley-milling
Stainless steel sieve, 3 inch, No. 325 (45 µm)	Hogentogler & Co. Inc, Columbia, MD, USA	1313	Sieving of MPs after Wiley-milling
Stainless steel sieve, 3 inch, No. 60 (250 µm)	Hogentogler & Co. Inc, Columbia, MD, USA	1303	Sieving of MPs after Wiley-milling
Stainless steel top cover, 3 inch	Hogentogler & Co. Inc, Columbia, MD, USA	8406	Sieving of MPs after Wiley-milling
Stainless steel tweezers	Global Industrial, Port Washington, NY, USA	T9FB2264892	Transferring of frozen film particles from jar into blender
Vacuum oven, model 281A	Fisher Scientific, Waltham, MA, USA	13-262-50	Vacuum oven to dry NPs after wet-grinding
Friction grinding machine, Supermass Colloider	Masuko Sangyo, Tokyo, Japan	MKCA6-2J	Grinding machine to form NPs from MPs
Wet-grinding stone, grit size: 297 µm -420 µm	Masuko Sangyo, Tokyo, Japan	MKE6-46DD	Grinding stone to form NPs from MPs
Wiley Mini Mill, rotary cutting mill	Thomas Scientific, Swedesboro, NJ, USA	NC1346618	Size reduction of pellets and film into MPs and NPs
Software			
FTIR-Spectroscopy software	Perkin Elmer, Waltham, MA, USA	Spectrum 10	Collection of spectra from the initial plastic, MPs and NPs
Image J, image processing program	National Institutes of Health, Bethesda, MD, USA	Version 1.53n	Analysis of digital images received from microscopy
Microscope software, ds-fi1 software	Malvern Panalytical, Malvern, UK	Firmware DS-U1 Ver3.10	Recording of digital images
Microsoft, Windows, Excel 365, spreadsheet software	Microsoft, Redmond, WA, USA	Office 365	Calculating the average particle size and creating FTIR spectra images
JMP software, statistical software	SAS Institute Inc., Cary, NC, 1989-2021	Version 15	Statistical analysis of particle size and perform best fit of data set
Unscrambler software	Camo Analytics, Oslo, Norway	Version 9.2	Normalizing and converting FTIR spectra into .csv format