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CLAY	Modifier	Monomer/Polymer	Comments	Main Author, ref.
<b>POLYLACTIDE</b>				
Synthetic Fluorine Mica (COOP Chemicals Co., Japan)	N(cocoalkyl)-N,N-[bis(2-hydroxyethyl)-N-methylammonium.	D-lactide 1.1-1.7%	Twin screw XRD = Intercalated.	Ray, S.S. [i]
Montmorillonite	1) octadecylammonium (ODA), 2) Octadecyltrimethylammonium (SBE)	D-lactide 1.1-1.7%	Twin screw XRD/TEM = Intercalated	Ray, S.S. [ii]
Montmorillonite with 1 and 2 Synthetic Fluorine with 3	1) octadecylammonium (ODA), 2) Octadecyltrimethylammonium (SBE), 3) dimethyldioctadecyl ammonium (MAE)	D-lactide 1.1-1.7%	Twin screw XRD = Intercalated.	Ray, S.S. [iii]
MMT (CEC=110) with 1 MMT (CEC=90) with 2 and 3 SAP (CEC=86.6) with 4 Mica (CEC=120) with 5	1) octadecylammonium, 2) dioctadecyldimethylammonium 3) octadecyltrimethylammonium, 4) hexadecyltributylphosphonium 5) N-(cocoalkyl)-N,N-[bis(2-hydroxyethyl)-N-methylammonium	D-lactide 1.1-1.7%	Twin screw XRD/TEM = 1) and 2) Intercalated-and-flocculated. 3) intercalated. 4) Disorder intercalated, 5) Coexisting of intercalated and exfoliated.	Ray, S.S. [iv]
MMT (from Nanocor) CEC=110	octadecylammonium (ODA)	D-lactide 1.1-1.7%	Twin screw	Ray, S.S. [v]
MMT (from Nanocor) CEC=110	octadecylammonium (ODA)	D-lactide 1.1-1.7%	Twin screw XRD/TEM = Flocculated, but better parallel stacking.	Ray, S.S. [vi]
MMT (CEC=90)	trimethyl octadecylammonium	D-lactide 1.1-1.7%	Twin screw XRD/TEM = Intercalated	Ray, S.S. [vii]
Synthetic Fluorine Mica	N(cocoalkyl)-N,N-[bis(2-hydroxyethyl)-N-methylammonium	D-lactide 1.1-1.7%	Twin screw XRD/TEM = Stacked and flocculated layers	Ray, S.S. [viii]
MMT (CEC=110) with 1 MMT (CEC=90) with 2 Saponite (CEC=86.6) with 3 Synthetic Fluorine Mica (CEC=120) with 4)	1) Octadecylammonium 2) Octadecyltrimethylammonium 3) hexadecyltributylphosphonium 4) Dipolyoxyethylene alkyl (coco) methylammonium (MEE)	D-lactide 1.1-1.7%	Twin screw XRD/TEM = 1) Intercalated and flocculated, 2) Intercalated, 3) Disordered intercalated or near to exfoliation, 4) Coexisting of intercalated and exfoliated.	Ray, S.S. [ix]

Nothing new					Ray, S.S. [x]
MMT	1) dimethyl dioctadecyl ammonium	D-lactide 1.1-1.7%	Twin Screw XRD/TEM = Intercalated, stacked and flocculated.	Ray, S.S [xi]	
MMT	Octadecylammonium	D-lactide 1.1-1.7%	Melt extrusion XRD/TEM = Intercalated, stacked and flocculated.	Ray, S.S [xii]	
MMT	1) Cloisite 30B (bis (2-hydroxyethyl)-methyl tallowalkyl ammonium 2) Cloisite 25A (dimethyl-2-ethylhexyl (hydrogenated tallowalkyl) ammonium)	Monomer = L, L-lactide	In situ-polymerisation. XRD = C30B XRD silent, C25A Intercalated.	Dubois, P [xiii]	
MMT	1) Cloisite 30B 2) Cloisite 25A 3) Na <sup>+</sup> Cloisite	100% L-lactide, Compatibiliser = PEG	Brabender XRD = Intercalated	Dubois, P [xiv]	
MMT	1) Na <sup>+</sup> Cloisite 2) Cloisite 25A	4.1 mol% D-lactide	Brabender XRD = C25A = Intercalated	Dubois, P [xv]	
MMT	1) Cloisite 30B	Monomer L, L-Lactide, Polymer = 92% L-lactide, Compatibiliser = PEG	Brabender = Intercalated Solution Polymerisation = Exfoliated	Dubois, P [xvi]	
MMT	1) Hexadecylamine 2) dodecyltrimethyl ammonium 3) Cloisite 25A	PLA with and without high starch content (43%).	Solvent Casting (N,N'-Dimethylacetamide XRD/TEM = Intercalation, but little exfoliation.	Chang, J-H [xvii]	
MMT Fluorinated Mica	1) Hexadecylamine	PLA (high starch content)	Solvent Casting (N,N'-Dimethylacetamide XRD/TEM = Intercalation, but no exfoliation.	Chang, J-H [xviii] (includes Giannelis)	
MMT with 3 Smectite with 1-4 Mica with 3	1) n-octyl tri-n-butyl phosphonium bromide, 2) n-dodecyl tri-n-butyl phosphonium bromide, 3) n-hexadecyl tri-n-butyl phosphonium bromide, 4) methyl tri phenyl phosphonium bromide.	PLA (1.1-1.7wt% D)	Twin screw XRD/TEM Intercalation only for C12 and above.	Okamoto, M [xix]	

MMT	Diocetadecyl trimethyl ammonium chloride.		Melt extrusion	Giannelis, E.P [xx]
Flurohectorite				
MMT	1) Cloisite 30B	Monomer L, L-Lactide, Polymer = 92%, L-lactide, Compatibiliser = PEG	Brabender = Intercalated Solution Polymerisation = Exfoliated	Dubois, P [xxi]
MMT	Distearyl/dimethylammonium	PLA	Solvent Cast blended using chloroform Intercalated	Ogata, N [xxii]
MMT	1) Na <sup>+</sup> Cloisite 2) Cloisite 25A	PLA (4.1% D-configuration) + plasticizer poly(ethylene glycol)	Twin Screw Intercalated.	Pluta M. [xxiii]
<b>PHB/HV (Poly(hydroxybutyrate-co-hydroxyvalerate) AND PHB</b>				
MMT	Cloisite 30B	PHB/HV copolymer (≈6% HV)	Melt Blending XRD/TEM = Intercalated	Park, O.O.[xxiv]
Kaolinite	DMSO	Bacterial polyhydroxybutyrate, & polyethylene oxide	Microstructure. PHB = mixing then heated to fusion XRD = Intercalated	Wytych, F [xxv]
<b>Chitosan</b>				
SWy-I	Na <sup>+</sup> /Cationic Chitosan	Cationic-clay mixtures	Solution mixing (acetic acid) XRD/TEM = Intercalated	Ruiz-Hitzky, E. [xxvi]
MMT	Tricetadecylmethyl ammonium	Poly (butyl acrylate) – modified - Chitosan	Solution mixing (acetic acid) XRD/TEM = Intercalated	Yue'e, F [xxvii]
<b>Starch</b>				
MMT		Glycerol-plasticized starch (cornstarch)	Single Screw No mention of intercalation/exfoliation.	Yu, J-G. [xxviii]
MMT	1) Cloisite Na <sup>+</sup> 2) Cloisite 6A (dimethyl, dehydrogenated-tallow quarternary ammonium) 3) Cloisite 30B	Potato	Melt blending XRD/TEM = 1) intercalates, 2-4) no intercalation, but weak peaks – no exfoliation in TEM.	Ha, C-S [xxix]

	4) Cloisite 10A				
MMT	1) Cloisite Na+ 2) Cloisite 30B	Potato by gelatinizing and plasticizing with water and glycerol	Melt blending XRD/TEM = 1) intercalation, 2) no intercalation.	Ha, C-S [xxx]	
Hectorite		Cara Starch Glycerol – plasticized.	Melt blending XRD= intercalated.	Wilhelm, H-M [ xxxi]	
Kaolinite, Brucite, Hectorite, LDHs		Cara Starch Glycerol – plasticized	Solution casting	Wilhelm, H-M [ xxxii]	
Kaolinite		Cornstarch (28% amylose). Glycerin (20-40%)	Melt Compounded. XRD = no analysis.	Curvelo, A.A.S. [ xxxiii]	
<b>Cellulose Acetate</b>					
MMT	Cloisite 30B	CA Triethyl citrate -plasticized. Maleic anhydride grafted cellulose acetate butyrate - compatibiliser	Melt compounding Compatibiliser improved exfoliation. Some sign of intercalated structure.	Park, H-M. [xxxiv]	
<b>Polycaprolactone</b>					
MMT	1) Cloisite Na+ 2) Cloisite 30B	E-caprolactone (monomer) PCL (polymer)	In situ-polymerisation Melt blending. Intercalated by melt blending with 2) or in situ polymerisation with 1 Exfoliated by in situ polymerisation with 2).	Vittoria, V [ xxxv], includes Dubois.	
MMT (Cloisite Na+)	Mixtures of (CH <sub>3</sub> ) <sub>2</sub> (C <sub>16</sub> H <sub>33</sub> ) <sup>N+</sup> (CH <sub>2</sub> CH <sub>2</sub> OH) with hexadecyl trimethyl ammonium		In situ polymerisation XRD/TEM = below 50% hydroxyl gps gives intercalate, above gives exfoliated.	Vittoria, V. [ xxxvi] (includes Dubois). & Dubois, P. [ xxxvii]	
MMT	Protonated 12-aminolauric acid	ε-CL/PCL (polymer)	In situ polymerisation, then solution blending with PCL in chloroform. Films formed by heat pressing. XRD = Intercalated. Blends	Vittoria, V. [ xxxviii, xxxix, xl]	

				have smaller d-spacing than initial in situ polymerised sample.	
MMT (SCP)	1) Na+ Cloisite 2) protonated 12-aminododecanoic acid 3) quaternizes octadecylamine 4) di(hydrogenated tallo)w dimethylammonium 5) [(bis(2-hydroxyethyl)methyl hydrogenated tallo)w ammonium.	PCL		Mechanical Kneading XRD = 1) and 2) interlayer space unchanged 3-5 intercalated	Dubois, P. [xli]
MMT	1) Cloisite 30B 2) Cloisite 25A 3) Cloisite Na+	1 <sup>st</sup> CL masterbatches, then PVC or PCL		1 <sup>st</sup> in situ polymerisation, then mechanical kneading. XRD/TEM = Masterbatches (mb) were intercalated. With PCL/mb get intercalated, with PVC/mb claim exfoliation.	Dubois, P [xliii]
MMT	3) Cloisite Na+	CL		In situ polymerisation XRD/TEM = 1) = exfoliated (depending on wt% of clay), 2 and 3) = Intercalated.	Dubois, P [xliii]
MMT	1) Cloisite 30B 2) Cloisite 25A 3) Nanofl 820 (HOOC-C <sub>11</sub> H <sub>22</sub> NH <sub>3</sub> <sup>+</sup> ) 4) Cloisite Na+	CL/PCL		In situ polymerisation and Mechanical kneading. XRD/TEM = Melt = 3+4) = same, 1+2) = Intercalated. In situ = 3+4) = intercalated, 1+2) = Exfoliated.	Dubois, P. [xliiv] Dubois, P. [xlv]
MMT	1) Cloisite 30B 2) Cloisite 25A	PCL		Mechanical mixing XRD = Initial mixing = Intercalated. Becomes increasingly exfoliated at elevated temperatures during DMA measurements.	Kwak, S-Y. [xlvi]
MMT	di-stearyl/dimethylammonium	CL		Solution Casting (Chloroform) XRD = No intercalation.	Ogata, N. [xlvii]
MMT	1) Cloisite 30B 2) Cloisite 15A (dimethyl,	CL (in situ) then PS, HIPS, ABS, PP and PE (melt		In situ polymerisation then melt compounding.	Wilkie, C.A. [xlviii]

	dehydrogenated tallow alkyl ammonium)	blending)	XRD/TEM = Those formed with C15A = intercalated, C30B = exfoliated. Polymer miscibility issues raised.	
MMT Fluoromica Hectorite	1) n-octyltri-n-butylphosphonium 2) n-dodecyltri-n-butylphosphonium. 3) n-hexadecyltri-n-butylphosphonium 4) methyltriphenylphosphonium.	Hydroxyl terminated oligo-PCL.	Direct mixing/sonication. XRD= For MMT, 4) same, 1-3) Intercalated. For Mica with 3) intercalated. For hectorite with 3) disordered/exfoliated.	Maiti, P. [xlix]
MMT (Somasif ME1000	Hexadecyltrimethylammonium	PCL Also in blends with poly(styrene-co-acrylonitrile) (SAN)	In situ polymerisation XRD – Intercalated structure.	Piglowski, J. [l]
MMT	1) Kumifit-F (Na <sup>+</sup> )	CL, then blended with SAN.	In situ then melt compounded with SAN. XRD/TEM = Claim exfoliation with 1) via in situ, which is retained upon mixing with SAN	Lee, S.S. [li]
MMT	Nanomer 1.30E (octadecylamine)	Wheat Starch-PCL blends	Reactive Twin Screw (in presence of glycerol, peroxide) XRD= Intercalated, also decrease in interlayer spacing.	Rizvi, S.S.H. [liii]
MMT Carbon Black	Cetyl trimethyl ammonium	PCL/poly(vinyl butyral) (PVB)	Solution exfoliation XRD = Claim exfoliation?	Wu, T-M. [liiii]
Molecular dynamics simulations				
There are several others including: Iannace, S. et al. [lv, lvi, lvii], Ko, M.B. et al. [lviii], Wei, K.H. et al. [lix], Messersmith, P.B. and Giannelis, E.P. [lx, lxi].				
<b>Cotton</b>				
MMT	1) Na 2) Ammonium salt of dodecylamine 3) Li/DMAc	Cotton Linters and card waste, short-fiber cotton by-products of the milling process	Solution casting Claims 'true' nanocomposite with 2) Li unsuccessful	White, L.A. [lxii]
<b>Biodegradable Aliphatic Polyester (synthesised from diols and dicarboxylic acids)</b>				

MMT	Cloisite 25A	1,4-butanediol, ethylene glycol, succinic acid, adipic acid	Solvent Casting XRD = Intercalated.	Choi, H.J. [ixiii]
MMT	1) Cloisite 30B 2) Cloisite 10A	1,4-butanediol, ethylene glycol, succinic acid, adipic acid	Melt Compounded XRD = 2) Intercalated, 1) intercalated at low wt%, becoming more exfoliated at high wt% ( $\approx 30\text{wt}\%$ ).	Ha, C-S. [ixiv]
<b>Plant Oils</b>				
MMT	1) dodecylamine 2) octadecylamine 3) 12-aminododecanoic acid.	Epoxidized soybean and/or linseed oils.	In situ polymerisation. XRD = silent suggesting exfoliated TEM = 1) and 3) = clay aggregates. 2) dispersed with thickness of 8-20 nm.	Kobayashi, S. [ixv, [ixvi].
MMT	Cloisite 30B	Monomers 1) Acrylated epoxidized soybean. (AESO). 2) Maleinized acrylated epoxidized soybean oil (MAESO), 3) Soybean oil pentaerythritol (SOPERMA).	In situ polymerisation XRD/TEM = Claim exfoliated for 3 wt% and exfoliated/intercalated for 5 wt%.	Wool, R.P. [ixvii]

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