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Supporting Information

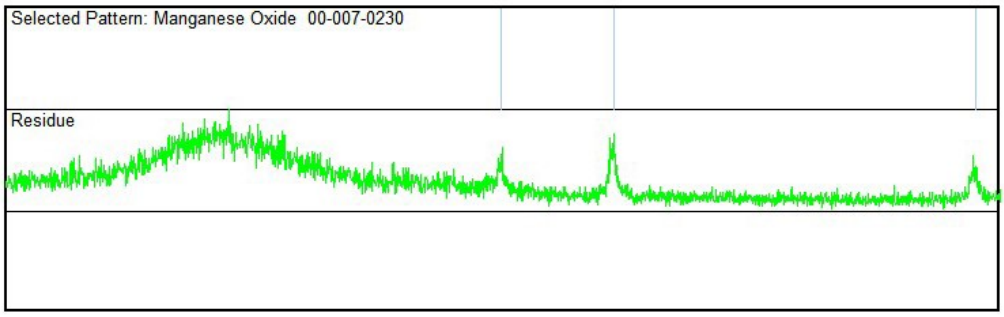

Figure S1. PDF 00-007-0230 and XRD spectra of Mn/SRBC

Table S1. IR Spectrum table by frequency range

IR SPECTRUM TABLE BY FREQUENCY RANGE					
Use this table when you already know the frequency of your material. Find the frequency range in the first column on the left side of the chart and corresponding values in adjacent columns. If you need to find the frequency of a material go to the IR table by compound.					
Frequency Range	**Absorption (cm-1)**	**Appearance**	**Group**	**Compound Class**	**Comments**
4000-3000 cm-1	3700-3584	medium, sharp	O-H stretching	alcohol	free
□	3550-3200	strong, broad	O-H stretching	alcohol	intermolecular bonded
□	3500	medium	N-H stretching	primary amine	□
□	3400	□	□	□	□
□	3400-3300	medium	N-H stretching	aliphatic primary amine	□
□	3330-3250	□	□	□	□
□	3350-3310	medium	N-H stretching	secondary amine	□

□	3300-2500	strong, broad	O-H stretching	carboxylic acid	usually centered on 3000 cm-1
□	3200-2700	weak, broad	O-H stretching	alcohol	intramolecular bonded
□	3000-2800	strong, broad	N-H stretching	amine salt	□
3000-2500 cm-1	□	□	□	□	□
3000-2500 cm-1	3333-3267	strong, sharp	C-H stretching	alkyne	□
□	3100-3000	medium	C-H stretching	alkene	□
□	3000-2840	medium	C-H stretching	alkane	□
□	2830-2695	medium	C-H stretching	aldehyde	doublet
□	2600-2550	weak	S-H stretching	thiol	□
2400-2000 cm-1	□	□	□	□	□
2400-2000 cm-1	2349	strong	O=C=O stretching	carbon dioxide	□
□	2275-2250	strong, broad	N=C=O stretching	isocyanate	□
□	2260-2222	weak	CΞN stretching	nitrile	□
□	2260-2190	weak	CΞC stretching	alkyne	disubstituted
□	2175-2140	strong	S-CΞN stretching	thiocyanate	□

□	2160-2120	strong	N=N=N stretching	azide	□
□	2150	□	C=C=O stretching	ketene	□
□	2145-2120	strong	N=C=N stretching	carbodiimide	□
□	2140-2100	weak	CΞC stretching	alkyne	monosubstituted
□	2140-1990	strong	N=C=S stretching	isothiocyanate	□
□	2000-1900	medium	C=C=C stretching	allene	□
□	2000	□	C=C=N stretching	ketenimine	□
2000-1650 cm-1	□	□	□	□	□
2000-1650 cm-1	2000-1650	weak	C-H bending	aromatic compound	overtone
□	□	□	□	□	□
□	1870-1540	□	□	□	□
□	1818	strong	C=O stretching	anhydride	□
□	1750	□	□	□	□
□	1815-1785	strong	C=O stretching	acid halide	□
□	1800-1770	strong	C=O stretching	conjugated acid halide	□
□	1775	strong	C=O stretching	conjugated anhydride	□
□	1720	□	□	□	□
□	1770-1780	strong	C=O stretching	vinyl / phenyl ester	□

□	1760	strong	C=O stretching	carboxylic acid	monomer
□	1750-1735	strong	C=O stretching	esters	6-membered lactone
□	1750-1735	strong	C=O stretching	δ-lactone	γ: 1770
□	1745	strong	C=O stretching	cyclopentanone	□
□	1740-1720	strong	C=O stretching	aldehyde	□
□	1730-1715	strong	C=O stretching	α,β-unsaturated ester	or formates
□	1725-1705	strong	C=O stretching	aliphatic ketone	or cyclohexanone or cyclopentenone
□	1720-1706	strong	C=O stretching	carboxylic acid	dimer
□	1710-1680	strong	C=O stretching	conjugated acid	dimer
□	1710-1685	strong	C=O stretching	conjugated aldehyde	□
□	1690	strong	C=O stretching	primary amide	free (associated: 1650)
□	1690-1640	medium	C=N stretching	imine / oxime	□
□	1685-1666	strong	C=O stretching	conjugated ketone	□
□	1680	strong	C=O stretching	secondary amide	free (associated: 1640)

□	1680	strong	C=O stretching	tertiary amide	free (associated: 1630)
□	1650	strong	C=O stretching	δ-lactam	γ: 1750-1700 β: 1760-1730
1670-1600 cm-1	□	□	□	□	□
1670-1600 cm-1	1678-1668	weak	C=C stretching	alkene	disubstituted (trans)
□	1675-1665	weak	C=C stretching	alkene	trisubstituted
□	1675-1665	weak	C=C stretching	alkene	tetrasubstituted
□	1662-1626	medium	C=C stretching	alkene	disubstituted (cis)
□	1658-1648	medium	C=C stretching	alkene	vinylidene
□	1650-1600	medium	C=C stretching	conjugated alkene	□
□	1650-1580	medium	N-H bending	amine	□
□	1650-1566	medium	C=C stretching	cyclic alkene	□
□	1648-1638	strong	C=C stretching	alkene	monosubstituted
□	1620-1610	strong	C=C stretching	α,β-unsaturated ketone	□
1600-1300 cm-1	□	□	□	□	□
1600-1300 cm-1	1550-1500	strong	N-O stretching	nitro compound	□

□	1372-1290	□	□	□	□
□	1465	medium	C-H bending	alkane	methylene group
□	1450	medium	C-H bending	alkane	methyl group
□	1375	□	□	□	□
□	1390-1380	medium	C-H bending	aldehyde	□
□	1385-1380	medium	C-H bending	alkane	gem dimethyl
□	1370-1365	□	□	□	□
1400-1000 cm-1	□	□	□	□	□
1400-1000 cm-1	1440-1395	medium	O-H bending	carboxylic acid	□
□	1420-1330	medium	O-H bending	alcohol	□
□	1415-1380	strong	S=O stretching	sulfate	□
□	1200-1185	□	□	□	□
□	1410-1380	strong	S=O stretching	sulfonyl chloride	□
□	1204-1177	□	□	□	□
□	1400-1000	strong	C-F stretching	fluoro compound	□
□	1390-1310	medium	O-H bending	phenol	□
□	1372-1335	strong	S=O stretching	sulfonate	□
□	1195-1168	□	□	□	□
□	1370-1335	strong	S=O stretching	sulfonamide	□

□	1170-1155	□	□	□	□
□	1350-1342	strong	S=O stretching	sulfonic acid	anhydrous
□	1165-1150	□	□	□	hydrate: 1230-1120
□	1350-1300	strong	S=O stretching	sulfone	□
□	1160-1120	□	□	□	□
□	1342-1266	strong	C-N stretching	aromatic amine	□
□	1310-1250	strong	C-O stretching	aromatic ester	□
□	1275-1200	strong	C-O stretching	alkyl aryl ether	□
□	1075-1020	□	□	□	□
□	1250-1020	medium	C-N stretching	amine	□
□	1225-1200	strong	C-O stretching	vinyl ether	□
□	1075-1020	□	□	□	□
□	1210-1163	strong	C-O stretching	ester	□
□	1205-1124	strong	C-O stretching	tertiary alcohol	□
□	1150-1085	strong	C-O stretching	aliphatic ether	□
□	1124-1087	strong	C-O stretching	secondary alcohol	□
□	1085-1050	strong	C-O stretching	primary alcohol	□

□	1070-1030	strong	S=O stretching	sulfoxide	□
□	1050-1040	strong, broad	CO-O-CO stretching	anhydride	□
1000-650 cm-1	□	□	□	□	□
1000-650 cm-1	995-985	strong	C=C bending	alkene	monosubstituted
□	915-905	□	□	□	□
□	980-960	strong	C=C bending	alkene	disubstituted (trans)
□	895-885	strong	C=C bending	alkene	vinylidene
□	850-550	strong	C-Cl stretching	halo compound	□
□	840-790	medium	C=C bending	alkene	trisubstituted
□	730-665	strong	C=C bending	alkene	disubstituted (cis)
□	690-515	strong	C-Br stretching	halo compound	□
□	600-500	strong	C-I stretching	halo compound	□
900-700 cm-1	□	□	□	□	□
900-700 cm-1	880 ± 20	strong	C-H bending	1,2,4-trisubstituted	□
□	810 ± 20	□	□	□	□
□	880 ± 20	strong	C-H bending	1,3-disubstituted	□
□	780 ± 20	□	□	□	□
□	(700 ± 20)	□	□	□	□

□	810 ± 20	strong	C-H bending	1,4-disubstituted or	□
□	□	□	□	1,2,3,4-tetrasubstituted	□
□	780 ± 20	strong	C-H bending	1,2,3-trisubstituted	□
□	(700 ± 20)	□	□	□	□
□	755 ± 20	strong	C-H bending	1,2-disubstituted	□
□	750 ± 20	strong	C-H bending	monosubstituted	□
□	700 ± 20	□	□	benzene derivative	□

Table S2. IR table by compound class

IR TABLE BY COMPOUND CLASS				
If you are looking up the absorption of a particular compound class, use this IR spectrum chart. If you already know the frequency, use the IR frequency table above.				
Compound Class	**Group**	**Absorption (cm-1)**	**Appearance**	**Comments**
acid halide	C=O stretching	1815-1785	strong	□
alcohols	O-H stretching	3700-3584	medium, sharp	free
□	O-H stretching	3550-3200	strong, broad	intermolecular bonded
□	O-H stretching	3200-2700	weak, broad	intramolecular bonded
□	O-H bending	1420-1330	medium	□

aldehyde	C-H stretching	2830-2695	medium	doublet
□	C=O stretching	1740-1720	strong	□
□	C-H bending	1390-1380	medium	□
aliphatic ether	C-O stretching	1150-1085	strong	□
aliphatic ketone	C=O stretching	1725-1705	strong	or cyclohexanone or cyclopentenone
aliphatic primary amine	N-H stretching	3400-3300	medium	□
alkane	C-H stretching	3000-2840	medium	□
□	C-H bending	1465	medium	methylene group
□	C-H bending	1450	medium	methyl group
□	C-H bending	1385-1380	medium	gem dimethyl
□	C-H stretching	3100-3000	medium	□
□	C=C stretching	1678-1668	weak	disubstituted (trans)
□	C=C stretching	1675-1665	weak	trisubstituted
□	C=C stretching	1675-1665	weak	tetrasubstituted
□	C=C stretching	1662-1626	medium	disubstituted (cis)
□	C=C stretching	1658-1648	medium	vinylidene

□	C=C stretching	1648-1638	strong	monosubstituted
□	C=C bending	995-985	strong	monosubstituted
□	C=C bending	980-960	strong	disubstituted (trans)
□	C=C bending	895-885	strong	vinylidene
□	C=C bending	840-790	medium	trisubstituted
□	C=C bending	730-665	strong	disubstituted (cis)
alkyl aryl ether	C-O stretching	1275-1200	strong	□
alkyne	C-H stretching	3333-3267	strong, sharp	□
□	C≡C stretching	2260-2190	weak	disubstituted
□	C≡C stretching	2140-2100	weak	monosubstituted
allene	C=C=C stretching	2000-1900	medium	□
amine	N-H bending	1650-1580	medium	□
□	C-N stretching	1250-1020	medium	□
amine salt	N-H stretching	3000-2800	strong, broad	□
anhydride	C=O stretching	1818	strong	□
□	CO-O-CO stretching	1050-1040	strong, broad	□
aromatic amine	C-N stretching	1342-1266	strong	□

aromatic compound	C-H bending	2000-1650	weak	overtone
aromatic ester	C-O stretching	1310-1250	strong	□
azide	N=N=N stretching	2160-2120	strong	□
benzene derivative	□	700 ± 20	□	□
carbodiimide	N=C=N stretching	2145-2120	strong	□
carbon dioxide	O=C=O stretching	2349	strong	□
carboxylic acid	O-H stretching	3300-2500	strong, broad	usually centered on 3000 cm-1
□	C=O stretching	1760	strong	monomer
□	C=O stretching	1720-1706	strong	dimer
□	O-H bending	1440-1395	medium	□
conjugated acid	C=O stretching	1710-1680	strong	dimer
conjugated acid halide	C=O stretching	1800-1770	strong	□
conjugated aldehyde	C=O stretching	1710-1685	strong	□
conjugated alkene	C=C stretching	1650-1600	medium	□
conjugated anhydride	C=O stretching	1775	strong	□

conjugated ketone	C=O stretching	1685-1666	strong	□
cyclic alkene	C=C stretching	1650-1566	medium	□
cyclopentanone	C=O stretching	1745	strong	□
ester	C-O stretching	1210-1163	strong	□
esters	C=O stretching	1750-1735	strong	6-membered lactone
fluoro compound	C-F stretching	1400-1000	strong	□
halo compound	C-Cl stretching	850-550	strong	□
□	C-Br stretching	690-515	strong	□
□	C-I stretching	600-500	strong	□
imine / oxime	C=N stretching	1690-1640	medium	□
isocyanate	N=C=O stretching	2275-2250	strong, broad	□
isothiocyanate	N=C=S stretching	2140-1990	strong	□
ketene	C=C=O stretching	2150	□	□
ketenimine	C=C=N stretching	2000	□	□
monosubstituted	C-H bending	750 ± 20	strong	□
nitrile	CΞN stretching	2260-2222	weak	□

nitro compound	N-O stretching	1550-1500	strong	□
none	□	3330-3250	□	□
none	□	1870-1540	□	□
none	□	1750	□	□
none	□	1720	□	□
none	□	1372-1290	□	□
none	□	1375	□	□
none	□	1370-1365	□	□
none	□	1200-1185	□	□
none	□	1204-1177	□	□
none	□	1195-1168	□	□
none	□	1170-1155	□	□
none	□	1165-1150	□	hydrate: 1230-1120
none	□	1160-1120	□	□
none	□	1075-1020	□	□
none	□	1075-1020	□	□
none	□	915-905	□	□
none	□	810 ± 20	□	□
none	□	780 ± 20	□	□
none	□	(700 ± 20)	□	□
none	□	(700 ± 20)	□	□
phenol	O-H bending	1390-1310	medium	□

primary alcohol	C-O stretching	1085-1050	strong	□
primary amide	C=O stretching	1690	strong	free (associated: 1650)
□	N-H stretching	3500	medium	□
secondary alcohol	C-O stretching	1124-1087	strong	□
secondary amide	C=O stretching	1680	strong	free (associated: 1640)
secondary amine	N-H stretching	3350-3310	medium	□
sulfate	S=O stretching	1415-1380	strong	□
sulfonamide	S=O stretching	1370-1335	strong	□
sulfonate	S=O stretching	1372-1335	strong	□
sulfone	S=O stretching	1350-1300	strong	□
sulfonic acid	S=O stretching	1350-1342	strong	anhydrous
sulfonyl chloride	S=O stretching	1410-1380	strong	□
sulfoxide	S=O stretching	1070-1030	strong	□
tertiary alcohol	C-O stretching	1205-1124	strong	□
tertiary amide	C=O stretching	1680	strong	free (associated: 1630)

thiocyanate	S-CΞN stretching	2175-2140	strong	□
thiol	S-H stretching	2600-2550	weak	□
vinyl / phenyl ester	C=O stretching	1770-1780	strong	□
vinyl ether	C-O stretching	1225-1200	strong	□
α,β-unsaturated ester	C=O stretching	1730-1715	strong	or formates
α,β-unsaturated ketone	C=C stretching	1620-1610	strong	□
δ-lactam	C=O stretching	1650	strong	γ: 1750-1700 β: 1760-1730
δ-lactone	C=O stretching	1750-1735	strong	γ: 1770
1,2,3,4-tetrasubstituted	□	□	□	□
1,2,3-trisubstituted	C-H bending	780 ± 20	strong	□
□	C-H bending	880 ± 20	strong	□
1,2-disubstituted	C-H bending	755 ± 20	strong	□
□	C-H bending	880 ± 20	strong	□
1,4-disubstituted or	C-H bending	810 ± 20	strong	□