

## Supplementary Data

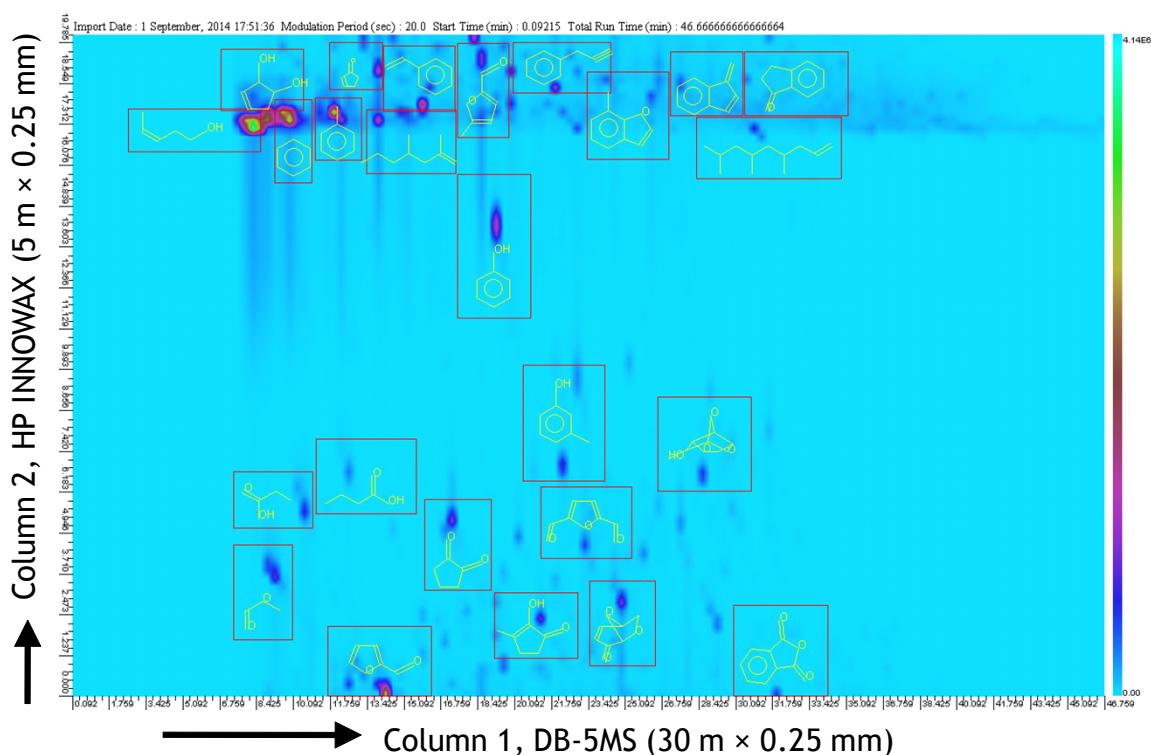
### **Fast Co-Pyrolysis of Cellulose and Polypropylene Using Py-GC/MS and Py-FT-IR**

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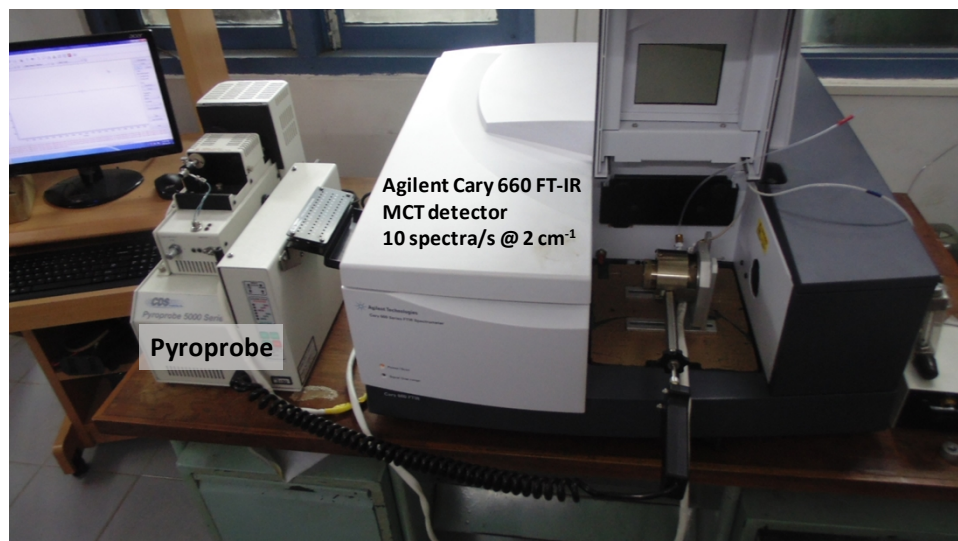
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**Figure S1. 2D-GC/MS total ion chromatogram of pyrolysates obtained from fast pyrolysis of equal composition mixture (C:PP 50:50) at 500 °C.**



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**Figure S2. Snapshot and construction of Pyroprobe®-FT-IR experimental set-up.**



**Table S1. Details of alcohols formed during fast co-pyrolysis of cellulose and polypropylene of different feed composition at 500 °C.**

Components	C:PP 100:0	C:PP 75:25	C:PP 50:50	C:PP 25:75	C:PP 0:100
11-Methyldodecanol	1.26	5.46	3.17	9.53	
2-Isopropyl-5-methyl-1-heptanol	0.56	4.60	3.52	4.56	
Cyclopropanol, 1-(3,7-dimethyl-1-octenyl)-		1.98	0.20	1.96	
(2,4,6-Trimethylcyclohexyl) methanol		1.86	5.30	4.76	
(R)-(-)-(Z)-14-Methyl-8-hexadecen-1-ol		1.71		0.22	
1-Dodecanol, 3,7,11-trimethyl-		1.62	2.00	5.64	
1-Propanol, 2-methyl-		0.83			
6,10,14-Trimethyl-pentadecan-2-ol		0.74			
2-Nonen-1-ol	0.18	0.52			
11,13-Dimethyl-12-tetradecen-1-ol acetate		0.50	2.71	0.13	
1-Decanol, 2-hexyl-		0.45	0.90	0.23	
1,7-Octadien-3-ol, 2,6-dimethyl-		0.37			
1-Heptanol, 4-methyl-		0.32			
1-Butanol, 2-ethyl-		0.21			
2-Decen-1-ol, (E)-		0.21			
(S)-3,4-Dimethylpentanol		0.20		0.17	
(2S,3S)-(-)-3-Propyloxiranemethanol		0.19			
3-Methyl-2-(3-methylpentyl)-3-buten-1-ol		0.18		0.61	
Hexanal, 5,5-dimethyl-	0.25	0.17			
Nonanal	0.41	0.13		0.07	
1-Octanol, 2-butyl-	0.29	0.09	0.92		
3-Pentenal, 4-methyl-		0.08			
E-10-Pentadecenol		0.08			
1-(1-Propynyl)cyclohexanol		0.06	0.26		
3-Nonen-1-ol, (E)-		0.06	0.44		
2-Octen-1-ol		0.05	0.11		
5,7-Octadien-3-ol, 2,4,4,7-tetramethyl-, (E)-		0.04			
(S)-3-Ethyl-4-methylpentanol		0.04			
Glycidol	1.04				
1,2,3-Cyclohexanetriol	0.88				
1-Propen-2-ol, acetate	0.54				
Cyclohexanol, 2,3-dimethyl-	0.53				
2-Pentanol, 5-(2-propynyloxy)-	0.44				
1,2-Ethanediol, monoacetate	0.37				
1,1-Dodecanediol, diacetate	0.11				
2,3-Dihydrooxazole, 2-t-butyl-4-(1-hydroxy-1-	0.10				

methylethyl)-3-methoxycarbonyl-5-methyl-					
Methyl tetrahydroionol			0.91	0.56	
Cyclododecanemethanol				0.53	
1-Nonanol, 4,8-dimethyl-				0.44	
2-Hexen-1-ol, 2-ethyl-				0.16	
11-Dodecen-1-ol, 2,4,6-trimethyl-, (R,R,R)-				0.14	
6-Octenal, 3,7-dimethyl-, (R)-				0.11	
4-Hepten-1-ol				0.09	
Cyclopentaneethanol, beta,2,3-trimethyl-			0.10	0.07	
E-2-Octadecadecen-1-ol				0.07	
2-Hexyl-1-octanol			1.12	0.03	
1-Dodecanol, 2-hexyl-			2.91		
11-Dodecen-1-ol, 2,4,6-trimethyl-			1.19		
3-Hepten-1-ol			0.43		
5-Hepten-2-ol, 6-methyl-			0.38		
2,6-Dimethyl-octa-2,6-dien-1-ol			0.36		
1-Decanol, 2-octyl-			0.32		
1-Heneicosanol			0.19		
1-Octanol, 2,7-dimethyl-			0.17		
1-Dodecanol, 2-octyl-			0.08		

**Table S2. Details of aldehydes and ketones formed during fast co-pyrolysis of cellulose and polypropylene of different feed composition at 500 °C.**

Components	C:PP 100:0	C:PP 75:25	C:PP 50:50	C:PP 25:75	C:PP 0:100
Acetaldehyde, hydroxy-	4.66	1.66	0.40		
2-Pentanone, 5-hydroxy-	3.81				
1,2-Cyclopentanedione	3.80	2.90	1.01	0.28	
2-Cyclopenten-1-one, 2-hydroxy-3-methyl-	2.38	1.07	0.80	0.20	
2-Propanone, 1-hydroxy-	2.07	0.61			
2-Cyclopenten-1-one, 2-hydroxy-	1.36	1.07	0.81	0.54	
Glutaraldehyde	1.02				
3-Cyclopenten-1-one, 2,2,5,5-tetramethyl-	0.72	0.08			
Cinnamaldehyde, alpha-methyl-	0.64				
3-Buten-2-one, 3-methyl-	0.44				
4-Penten-2-one	0.43				
1,4-Dioxaspiro[2.4]heptan-5-one, 7-methyl-	0.36				
1,3-Dioxol-2-one,4,5-dimethyl-	0.26				
1,3-Dioxolane-4,5-dione	0.24				
2-Buten-1-one, 1-(6,7,7-trimethyl-2,3-dioxabicyclo[2.2.2]oct-5-en-1-yl)-	0.21				
4-Ethyl-2-hydroxycyclopent-2-en-1-one	0.20	0.54		0.24	
Cyclohexanone, 2-ethyl-2-propyl-	0.14			0.07	
7-Methylindan-1-one	0.13				
2-Dodecylcyclohexanone	0.12				
Cyclohexanone, 4-methylidene-	0.12				
2,2-Dimethyl-3-heptanone	0.09				
2-Cyclohexen-1-one, 4-ethyl-3,4-dimethyl-	0.04				
5-Ethyl-4-tridecanone		0.82			
Ethanone, 1-(1,2,2,3-tetramethylcyclopentyl)-, (1R-cis)-		0.65			
4-Ethyl-2-hydroxycyclopent-2-en-1-one		0.54			
Cyclohexanone, 4-ethoxy-		0.25			
Cyclopentanone, 2-methyl-		0.25			
2-Oxepanone, 4-methyl-		0.23			
5-Hepten-3-one, 5-ethyl-2-methyl-		0.16			
Cyclopentanone, 2-(1-methylpropyl)-		0.16			
3-Pentanone, 2-methyl-		0.15			
2-Ethyl-5-propylcyclopentanone		0.14			
3-Hepten-2-one, 4-methyl-		0.11			
2-Cyclopenten-1-one, 2-hydroxy-3,4-dimethyl-		0.11			

1,2-Cyclopentanedione, 3-methyl-		0.10			
2-Heptanone, 6-methyl-5-methylene-		0.08			
Cyclobutanone, 2-(2,6-dimethylheptyl)-		0.08			
4-Isopropyl-1,3-cyclohexanedione		0.06			
Cyclohexanone, 5-methyl-2-(1-methylethyl)-, (2R-cis)-		0.03			
4,4-Dimethyl-2-cyclopenten-1-one		0.02			
5-Ethyl-4-tridecanone			0.63		
2-Cyclohexen-1-one, 2-hydroxy-6-methyl-3-(1- methylethyl)-			0.43		
Succindialdehyde			0.33		
Cyclohexanone, 4-ethyl-3,4-dimethyl-			0.33		
1,4-Dioxaspiro[2.4]heptan-5-one, 6-methyl-			0.25		
Cyclohexanone, 4-ethoxy-			0.25		
2-Cyclopenten-1-one, 3-ethyl-2-hydroxy-			0.19		
1,2-Cyclopentanedione, 3-methyl-			0.18		
Oxetane, 2-propyl-			0.10		
1,3-Cyclohexanedione, 4-propyl-			0.09		
4-Ethyl-2-hydroxycyclopent-2-en-1-one				0.24	
Bicyclo[3.1.1]heptan-2-one, 6,6-dimethyl-, (1R)-				0.20	
Cyclohexanone, 4-ethoxy-				0.13	
Oxiranecarboxaldehyde, 3-methyl-3-(4-methyl-3- pentenyl)-				0.13	
Cyclohexanone, 2-ethyl-2-propyl-				0.07	
5-Ethyl-4-tridecanone				0.03	

**Table S3: Details of hydrocarbons formed during fast co-pyrolysis of cellulose and polypropylene of different feed composition at 500 °C.**

Components	C:PP 100: 0	C:PP 75:25	C:PP 50:50	C:PP 25:75	C:PP 0:100
1-Ethyl-2,2,6-trimethylcyclohexane	0.25	0.25			
Cyclopentane, (2-methyl-1-propenyl)-	0.13	0.13			
1,7-Dimethyl-4-(1-methylethyl)cyclodecane	0.30	0.3	0.63	0.37	2.94
1,19-Eicosadiene				0.31	1.49
1,7-Octadiene, 2,3,3-trimethyl-				0.27	0.62
1,7-Octadiene, 2,7-dimethyl-					1.00
10-Heneicosene (c,t)			0.13		0.92
1-Decene, 2,4-dimethyl-		0.64	0.63	0.1	0.26
1-Hexene, 2-methyl-		0.17		0.31	1.95
1-Hexene, 5-methyl-				0.53	0.52
1-Nonene, 4,6,8-trimethyl-		2.25	0.47	1.29	5.95
1-Nonylcycloheptane			0.09		0.11
1-Pentene, 2,4-dimethyl-			1.60	1.43	1.33
1-Pentene, 2-methyl-			1.72	1.61	2.40
1-Undecene, 7-methyl-				1.02	0.61
1-Undecene, 8-methyl-			0.24	0.2	5.58
2,3,3-Trimethyl-1-hexene			0.46	0.58	1.34
2,3-Dimethyl-3-heptene, (Z)-					0.29
2,4-Dimethyl-1-heptene			4.07	4.08	4.34
2-Decene, 4-methyl-, (Z)-			0.27	0.79	1.41
2-Hexene, 3,5-dimethyl-			0.78		2.89
2-Octene, 3,7-dimethyl-, (Z)-				0.43	1.15
3-Decene, 2,2-dimethyl-, (E)-					0.33
3-Eicosene, (E)-		0.30		1.31	8.34
3-Undecene, 4-methyl-				0.38	0.65
5-Ethyl-1-nonene				0.9	0.12
7-Octadecyne, 2-methyl-		0.29			4.83
9-Eicosene, (E)-					3.16
9-Hexacosene			0.41	0.18	1.17
Bicyclo[3.1.1]heptane, 2,6,6-trimethyl-					1.29
Cyclohexane, 1,3,5-trimethyl-		0.13	0.57	1.08	1.43
Cyclooctane, 1,4-dimethyl-, cis-					3.92
Cyclooctane, 1,5-dimethyl-				0.23	0.28
Cyclopentane, 1,1,3,4-tetramethyl-, cis-				0.32	0.58
Cyclopentane, 1,1'-[3-(2-cyclopentylethyl)-1,5-pentanediy]bis-		0.36	0.73	0.21	1.43

Cyclopentane, 1,3-dimethyl-, cis-			0.23		0.28
Cyclopropane, 1-methyl-1-(2-methylpropyl)-2-nonyl-					0.53
Decane, 2,3,5,8-tetramethyl-				0.27	1.15
Heptane, 4-methyl-		0.42	1.8	1.17	1.76
Nonane, 2,6-dimethyl-			0.48	0.81	1.22
Nonane, 2-methyl-3-methylene-			1.21	0.85	2.36
Pentane		2.17	1.85	2.42	3.41
Propene			2.17	1.62	2.26
trans-2-Methyl-3-octene					1.36
(-)-trans-Pinane		0.03			0.17
1,1-Dimethyl-4-methylenecyclohexane		0.1		0.19	0.32
1,3-Pentadiene, 2,3-dimethyl-				0.77	0.55
1-Hexadecyne					0.10
1-Hexene, 3,3,5-trimethyl-		0.19	0.25	0.8	0.32
1-Isopropyl-1,4,5-trimethylcyclohexane		0.17			0.48
2,4-Dimethyl 1,4-pentadiene			0.34	0.58	0.29
2-Hexadecene, 3,7,11,15-tetramethyl-		0.49	0.29		0.07
2-Undecene, 4,5-dimethyl-			1.24		0.88
3-Eicosyne			0.11		0.61
3-Tetradecene, (Z)-					0.21
4-Methyldocosane					0.10
5-Methyl-2-hexene,c&t					0.08
cis-1,4-Dimethyl-2-methylenecyclohexane				0.25	0.16
Cyclobutane, 1,1-dimethyl-3-methylene-					0.06
Cyclohexane, 1,1'-(1,2-dimethyl-1,2-ethanediyl)bis-					0.17
Cyclohexane, 1,1,3-trimethyl-2-(3-methylpentyl)-					0.22
Cyclohexane, 1,2-diethyl-3-methyl-			0.38		0.51
Cyclohexane, 1,3-dimethyl-2-methylene-, trans-					0.13
Cyclohexane, 2,4-diethyl-1-methyl-			0.31	0.87	0.41
Cyclohexane, 2-butyl-1,1,3-trimethyl-					0.18
Cyclooctane, 1,4-dimethyl-, trans-		1.55	2.25	2.66	0.97
Cyclopropane, 1-(1,2-dimethylpropyl)-1-methyl-2-nonyl-		0.63			0.32
Cyclopropane, trimethylmethylene-			0.73	0.48	0.38
Heptane, 2,3,6-trimethyl-					0.44
Octane, 3,3-dimethyl-				0.28	0.38
Undecane, 6-cyclohexyl-				0.11	0.08
1,3-Hexadiene, 3-ethyl-2-methyl-, (Z)-					0.18



1-Nonene					0.15
3,4-Heptadiene					0.84
3-Octadecene, (E)-					0.19
7-Hexadecene, (Z)-		0.18			0.13
Cyclohexane, 1,1-dimethyl-2-propyl-		0.45			0.20
Cyclohexane, 1,2-diethyl-3-methyl-					1.01
Cyclohexane, 2-propyl-1,1,3-trimethyl-					0.35
Cyclopentane, 1,3-dimethyl-2-(1-methylethenyl)-					0.22
Dodecane, 1-cyclopentyl-4-(3-cyclopentylpropyl)-		0.12	0.28	0.06	0.62
Heptadecane, 2,6,10,15-tetramethyl-		0.25	0.17	0.29	0.14
Hexane, 1-(isopropylidencyclopropyl)-					0.35
Tridecane, 7-methylene-					0.26
2-Heptene, 4-methyl-, (E)-			0.23	2.24	
11-Tricosene		0.81		1.75	
Bicyclo[3.1.1]heptane, 2,6,6-trimethyl-		0.21		0.80	
1-Tridecene				0.25	
2-Decene, 7-methyl-, (Z)-				0.43	
Heptane, 2-methyl-3-methylene-			0.24	0.22	
Cyclopropane, 1-(1,1-dimethylethyl)-2-methylene-				0.64	
1-Hexyne, 5-methyl-			0.67	0.60	
Cyclopentane, 1,2,3,4,5-pentamethyl-		0.7	0.5	0.53	
1,6-Octadiene, 2,6-dimethyl-, (Z)-				0.35	
Heptane, 3-ethyl-				0.34	
Cyclohexene, 3,3,5-trimethyl-				0.28	
Cyclohexane, 1,1,4,4-tetramethyl-				0.23	
Cyclohexane, 1-ethyl-2-propyl-				0.21	
1-Octene, 3-methyl-				0.13	
4-Undecene, 8-methyl-, (Z)-				0.12	
1-Heptene, 2-methyl-				0.12	
Tetramethyl-cyclohexane		0.19		0.12	
Cyclohexane, 1-(1,5-dimethylhexyl)-4-(4-methylpentyl)-		0.17		0.10	
Cyclopentane, 1-ethenyl-3-ethyl-2-methyl-				0.09	
3-Tridecene				0.07	
2-Butene, 2-methyl-		0.1		0.22	
Cyclopropane, 2-(1,1-dimethyl-2-propenyl)-1,1-dimethyl-				0.19	
Tetracontane, 3,5,24-trimethyl-				0.18	
3-Octyne, 2-methyl-				0.16	

Dodecane, 2,7,10-trimethyl-				0.14	
2-Butene				0.14	
Heptadecane, 2,6-dimethyl-		0.21		0.11	
1,3-Dimethyl-5-n-decylcyclohexane		0.09		0.11	
Undecane, 6-cyclohexyl-				0.11	
Eicosene, (E)-			4.00		
Cyclotetradecane, 1,7,11-trimethyl-4-(1-methylethyl)-				0.94	
1-Methylpentyl cyclopropane				0.59	
1-Heptene, 6-methyl-				0.87	
Cyclohexane, 1,2,3-trimethyl-				0.48	
1-Nonyne				0.21	
Cyclohexane, 1,2,3,4,5,6-hexaethyl-				0.57	
1-Octyne				0.37	
3,5-Dimethylcyclopentene				0.28	
3-Octene, 2,2-dimethyl-				0.20	
1-Cyclohexylheptene				0.11	
2,4-Dimethyl-1-hexene		0.19	0.08		
Heptane, 5-ethyl-2-methyl-		0.44	0.70		
1-Hexene, 4,5-dimethyl-			0.38		
1,3-Pentadiene, 2,4-dimethyl-			0.35		
2-Methyl-Z-4-tetradecene			0.33		
Cyclopentane, (3-methylbutyl)-			0.29		
1,3-Dimethyl-1-cyclohexene		0.27	0.21		
Dodecane, 2,6,11-trimethyl-			0.20		
Cyclopentene, 4,4-dimethyl-			0.19		
Cyclopentane, (2-hexyloctyl)-		0.11	0.12		
1-Octene, 3,7-dimethyl-			0.11		
2,4-Hexadiene		0.06			
1,6-Octadiene, 2,5-dimethyl-, (E)-		0.32			
1-Cyclohexylnonene		0.14			
3-Heptene, 2-methyl-, (E)-		0.57			
cis,cis,cis-1-Isobutyl-2,5-dimethylcyclohexane		0.14			
cis-1-Butyl-2-methylcyclopropane		0.12			
Cyclobutane, (1-methylethylidene)-		0.15			
Cyclohexane, 1,1,2-trimethyl-		0.10			
Cyclohexane, 1,3,5-trimethyl-2-octadecyl-		0.13			
Cyclohexane, 1,4-dimethyl-2-octadecyl-		0.19			
Cyclooctane, 1-methyl-3-propyl-		0.34			
Cyclopentane, (1-methylethyl)-		0.02			
Cyclopropane, 1-(1-methylethyl)-2-nonyl-		0.08			

Decane, 2,4,6-trimethyl-		0.11			
Mesitylene		0.19			
Propane		0.82			
1-Cyclohexyl-1-(4-ethylcyclohexyl)ethane		0.11			
1-Heptene, 3-methyl-		0.31			
1-Heptene, 4-methyl-		0.38			
1H-Indene, 3-methyl-		0.26			
Cyclohexane, 1,2,4-trimethyl-		0.40			
Cyclohexane, 1,3-dimethyl-2-methylene-, cis-		0.13			
Cyclopentane, 1-butyl-2-ethyl-		0.77			
Hexen-1-ylcyclohexane		0.11			
Isobutane		0.23			

**Table S4. Details of acids and esters formed during fast co-pyrolysis of cellulose and polypropylene of different feed composition at 500 °C.**

Components	C:PP 100:0	C:PP 75:25	C:PP 50:50	C:PP 25:75	C:PP 0:100
Propanoic acid, 2-oxo-	1.61				
2-Hydroxy-6-methyl-3-cyclohexen-1-carboxylic acid	0.35	0.06			
Hexanoic acid, 2-acetyl-, ethyl ester	1.07				
Acetic acid, oxo-	0.24				
Cyclohexan-1,4,5-triol-3-one-1-carboxylic acid	0.21				
2-Propenoic acid, methyl ester	0.15				
2-Propenoic acid, 2-methyl-, 3,3,5-trimethylcyclohexyl ester	0.12				
Butanedioic acid, 2,3-bis(acetyloxy)-	0.31				
Butanoic acid, 2-methyl-2-(1-methylethyl)-3-oxo-, ethyl ester	0.65				
2-Ethylbutyric acid, eicosyl ester		0.22			
Hexadecanoic acid, 2-oxo-, methyl ester		0.14			
Cyclopropane carboxylic acid, 2-methylene-, methyl ester		0.13			
6-Nonenoic acid, methyl ester		0.07			
Butanoic acid, 2-hydroxy-3,3-dimethyl-		0.06			
Oxalic acid, isobutyl pentyl ester		0.17			
Acrylic acid, 3-(1-methylcyclopropyl)-, E		0.09			
2-Hexenoic acid, 5-hydroxy-3,4,4-trimethyl-, (E)-			0.30	0.26	
Oxalic acid, allyl hexadecyl ester			0.09		
Acetic acid, 3,7,11,15-tetramethyl-hexadecyl ester			0.25		
1,2,4-Benzenetricarboxylic acid, 1,2-dimethyl ester				0.13	

**Table S5. Details of furan derivatives formed during fast co-pyrolysis of cellulose and polypropylene of different feed composition at 500 °C.**

<b>Components</b>	<b>C:PP 100:0</b>	<b>C:PP 75:25</b>	<b>C:PP 50:50</b>	<b>C:PP 25:75</b>	<b>C:PP 0:100</b>
2-Furaldehyde	1.82				
3-Furaldehyde	4.27	0.65	0.23		
5-Hydroxymethylfurfural	5.04	2.21			
2(3H)-Furanone, dihydro-4-hydroxy-	2.79	0.19			
2(5H)-Furanone	2.43	0.75			
2,4(3H,5H)-Furandione, 3-methyl-	0.56				
2,5-Dimethyl-4-hydroxy-3(2H)-furanone	2.07	0.51			
2,5-Furandicarboxaldehyde	1.65				
2,5-Furandione, 3-methyl-	0.24				
2-Furancarboxaldehyde, 5-methyl-	4.01	2.09	1.46		
2-Furanmethanediol, dipropionate	0.44				
2-Furanmethanol	0.61				
4-Methyl-5H-furan-2-one	0.75	0.24			
Furan, 2-propyl-	0.09				
Furan, 3-methyl-	0.31	0.12			
1-Propanone, 1-(2-furanyl)-	0.18				
5-Acetoxyethyl-2-furaldehyde	0.24				
2-Furanmethanol, tetrahydro-5-methyl-, trans-	0.07				
6-Hydroxyhexahydrocyclopenta[b]furan-2-one	0.24	0.4	0.34	0.81	
Furan, 2,5-dimethyl-	0.21	0.45			
2,4-Dihydroxy-2,5-dimethyl-3(2H)-furan-3-one		0.55			
3-Methyl-2-(2-oxopropyl)furan		0.53		0.05	
3-Furancarboxylic acid, methyl ester		0.51			
3-Furanmethanol		0.14	0.27		
2(5H)-Furanone, 5-(1-methylethyl)-		0.89			
2,2,3,3,4,4-Hexamethyltetrahydrofuran		0.05		0.07	
2-Furanacetic acid, -hydroxy-		0.27			
Benzofuran, 2-methyl-			0.20		
2(3H)-Furanone, 5-acetyldihydro-			0.26		

**Table S6. Details of anhydrosugars formed during fast co-pyrolysis of cellulose and polypropylene of different feed composition at 500 °C.**

<b>Components</b>	<b>C:PP 100:0</b>	<b>C:PP 75:25</b>	<b>C:PP 50:50</b>	<b>C:PP 25:75</b>	<b>C:PP 0:100</b>
1,4:3,6-Dianhydro- $\alpha$ -d-glucopyranose	1.70	1.45	2.06	0.89	
1,6:2,3-Dianhydro-4-O-acetyl- $\beta$ -d-gulopyranose	1.59				
2,3-Anhydro-d-mannosan	0.96	0.05		0.4	
2H-Pyran-2,6(3H)-dione	1.28				
2H-Pyran-3(4H)-one, dihydro-6-methyl-	0.10				
3,4-Anhydro-d-galactosan	1.29	0.72	0.36		
4H-Pyran-4-one, 2,3-dihydro-3,5-dihydroxy-6-methyl-	2.11		0.31		
4H-Pyran-4-one, 3,5-dihydroxy-2-methyl-	3.44	2.57			
$\alpha$ -D-Mannopyranoside, methyl 3,6-anhydro-	0.43				
Levogluosenone	2.41	1.49	0.2	0.13	
Tetrahydro-4H-pyran-4-ol	1.86				
$\alpha$ -D-Glucopyranoside, O- $\alpha$ -D-glucopyranosyl- (1.fwdarw.3)- $\beta$ -D-fructofuranosyl	0.10	0.04			
1,6:2,3-Dianhydro-4-deoxy- $\beta$ -d-ribo-hexopyranose		0.23			
6-Acetyl- $\beta$ -d-mannose		0.08			
2H-Pyran-2-one, tetrahydro-6,6-dimethyl-		0.10			
Indeno[3a,4-b]oxiren-2-ol, octahydro-4a-methyl-5- [(tetrahydro-2H-pyran-2-yl)oxy]-		0.39			
1,6:3,4-Dianhydro-2-deoxy- $\beta$ -d-lyxo-hexopyranose				0.29	

**Table S7. C, H and O composition of C:PP feed mixtures and bio-oils obtained at 500 °C.**

<b>Feed Composition Cellulose:PP (wt./wt.)</b>	<b>Feed composition (%)</b>			<b>Bio-oil composition (%)*</b>			<b>Deoxygenation (%)</b>
	<b>C</b>	<b>H</b>	<b>O</b>	<b>C</b>	<b>H</b>	<b>O</b>	
100:0	44.44	6.17	49.38	51.69	5.56	29.82	39.62
75:25	54.75	8.20	37.04	64.31	9.31	12.27	66.88
50:50	65.07	10.23	24.69	66.02	10.51	6.54	73.53
25:75	75.39	12.26	12.35	67.30	10.92	4.66	62.30

\* - Bio-oil composition was calculated using GC/MS product analysis

**Table S8. Composition and carbon number of key products formed when cellulose and PP were co-pyrolyzed in equal composition (C:PP 50:50) at 500 °C.**

Components	Carbon no.	Composition (%)
<b>Alcohols</b>		
(2,4,6-Trimethylcyclohexyl) methanol	C10	5.30
2-Isopropyl-5-methyl-1-heptanol	C10	3.52
11-Methyldodecanol	C13	3.17
1-Dodecanol, 2-hexyl-	C18	2.91
11,13-Dimethyl-12-tetradecen-1-ol acetate	C18	2.71
1-Dodecanol, 3,7,11-trimethyl-	C15	2.00
11-Dodecen-1-ol, 2,4,6-trimethyl-	C15	1.19
2-Hexyl-1-octanol	C14	1.12
1-Octanol, 2-butyl-	C12	0.92
Methyl tetrahydroionol	C14	0.91
1-Decanol, 2-hexyl-	C16	0.90
3-Nonen-1-ol, (E)-	C9	0.44
3-Hepten-1-ol	C7	0.43
5-Hepten-2-ol, 6-methyl-	C8	0.38
2,6-Dimethyl-octa-2,6-dien-1-ol	C10	0.36
1-Decanol, 2-octyl-	C18	0.32
1-(1-Propynyl)cyclohexanol	C9	0.26
Cyclopropanol, 1-(3,7-dimethyl-1-octenyl)-	C13	0.20
<i>Other alcohols with individual yield &lt;0.2%</i>		0.65
<b>Hydrocarbons</b>		
2,4-Dimethyl-1-heptene	C9	4.07
Eicosene, (E)-	C20	4.00
Cyclooctane, 1,4-dimethyl-, trans-	C10	2.25
Propene	C3	2.17
Pentane	C5	1.85
Heptane, 4-methyl-	C8	1.80
1-Pentene, 2-methyl-	C6	1.72
1-Pentene, 2,4-dimethyl-	C7	1.60
2-Undecene, 4,5-dimethyl-	C13	1.24
Nonane, 2-methyl-3-methylene-	C11	1.21
Cyclotetradecane, 1,7,11-trimethyl-4-(1-methylethyl)-	C20	0.94
1-Heptene, 6-methyl-	C8	0.87
2-Hexene, 3,5-dimethyl-	C8	0.78

Cyclopentane, 1,1'-[3-(2-cyclopentylethyl)-1,5-pentanediy] bis-	C22	0.73
Cyclopropane, trimethylmethylene-	C7	0.73
Heptane, 5-ethyl-2-methyl-	C10	0.70
1-Hexyne, 5-methyl-	C7	0.67
1,7-Dimethyl-4-(1-methylethyl)cyclodecane	C15	0.63
1-Decene, 2,4-dimethyl-	C12	0.63
1-Methylpentyl cyclopropane	C9	0.59
Cyclohexane, 1,3,5-trimethyl-	C9	0.57
Cyclohexane, 1,2,3,4,5,6-hexaethyl-	C12	0.57
Cyclopentane, 1,2,3,4,5-pentamethyl-	C10	0.50
Cyclohexane, 1,2,3-trimethyl-	C9	0.48
Nonane, 2,6-dimethyl-	C11	0.48
1-Nonene, 4,6,8-trimethyl-	C12	0.47
2,3,3-Trimethyl-1-hexene	C9	0.46
9-Hexacosene	C26	0.41
1-Hexene, 4,5-dimethyl-	C8	0.38
Cyclohexane, 1,2-diethyl-3-methyl-	C11	0.38
1-Octyne	C8	0.37
1,3-Pentadiene, 2,4-dimethyl-	C7	0.35
2,4-Dimethyl 1,4-pentadiene	C7	0.34
2-Methyl-Z-4-tetradecene	C15	0.33
Cyclohexane, 2,4-diethyl-1-methyl-	C11	0.31
2-Hexadecene, 3,7,11,15-tetramethyl-	C10	0.29
Cyclopentane, (3-methylbutyl)-	C10	0.29
3,5-Dimethylcyclopentene	C7	0.28
Dodecane, 1-cyclopentyl-4-(3-cyclopentylpropyl)-	C25	0.28
2-Decene, 4-methyl-, (Z)-	C11	0.27
1-Hexene, 3,3,5-trimethyl-	C9	0.25
1-Undecene, 8-methyl-	C12	0.24
Heptane, 2-methyl-3-methylene-	C9	0.24
2-Heptene, 4-methyl-, (E)-	C8	0.23
Cyclopentane, 1,3-dimethyl-, cis-	C7	0.23
1,3-Dimethyl-1-cyclohexene	C8	0.21
1-Nonyne	C9	0.21
3-Octene, 2,2-dimethyl-	C10	0.20
Dodecane, 2,6,11-trimethyl-	C15	0.20
<i>Other hydrocarbons with individual yield &lt;0.2%</i>		<i>1.11</i>



<b>Others</b>		
1,2-Cyclopentanedione	C5	1.01
2-Cyclopenten-1-one, 2-hydroxy-	C6	0.81
2-Cyclopenten-1-one, 2-hydroxy-3-methyl-	C6	0.80
5-Ethyl-4-tridecanone	C15	0.63
<i>Other Aldehydes/Ketones/Acids</i>		3.19
2-Furancarboxaldehyde, 5-methyl-	C6	1.46
<i>Other Furans</i>		1.30
1,4:3,6-Dianhydro- $\alpha$ -d-glucopyranose	C6	2.06
<i>Other Anhydrosugars</i>		0.87

**Table S9. Higher heating values (HHVs) of feed and products during fast co-pyrolysis of cellulose and polypropylene.**

<b>C:PP (wt./wt.) →</b>		<b>100:0</b>	<b>75:25</b>	<b>50:50</b>	<b>25:75</b>	<b>0:100</b>
<b>Experimental HHV (MJ kg<sup>-1</sup>)</b>	<b>Feed</b>	15.54	26.38	29.62	39.78	46.47
	<b>500 °C</b>	21.7	36.00	40.43	40.97	43.23
<b>Calculated HHV of bio-oil (MJ kg<sup>-1</sup>)</b>	<b>600 °C</b>	-	39.00	40.77	41.58	-
	<b>700 °C</b>	-	38.76	40.75	41.40	-
	<b>800 °C</b>	-	38.70	37.72	40.60	-