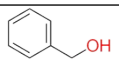
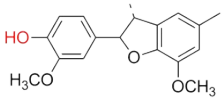
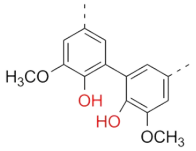
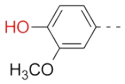
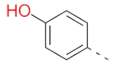
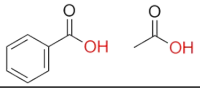
Table S2. Plasmids and bacterial strains used in this study

Strain or Plasmid	Relevant characteristics	Source or reference
Strains		
P. putida A514	Wild type, glucose, xylose, vanillate and lignin utilization	Prof. Dennis Gross lab (TAMU)
P. putida Cal-E-6	Wild type, glucose and xylose and vanillate utilization	Prof. Dennis Gross lab (TAMU)
P. putida A501	Wild type, glucose and xylose utilization	Prof. Dennis Gross lab (TAMU)
P. putida W4P396	Wild type, glucose utilization	Prof. Dennis Gross lab (TAMU)
P. putida W4P31	Wild type, glucose, xylose, vanillate and lignin utilization	Prof. Dennis Gross lab (TAMU)
P. putida W4P11	Wild type, glucose and xylose utilization	Prof. Dennis Gross lab (TAMU)
P. putida BGR	Wild type, glucose and xylose utilization	Prof. Dennis Gross lab (TAMU)
P. putida 3.1 W4P	Wild type, glucose, xylose, vanillate and lignin utilization	Prof. Dennis Gross lab (TAMU)
P. putida B723	Wild type, glucose and xylose utilization	Prof. Dennis Gross lab (TAMU)
P. putida Cal56	Wild type, glucose and xylose and vanillate utilization	Prof. Dennis Gross lab (TAMU)
P. putida B1487	Wild type, glucose utilization	Prof. Dennis Gross lab (TAMU)
P. putida W4P540	Wild type, glucose utilization	Prof. Dennis Gross lab (TAMU)
P. putida W4P64	Wild type, glucose, xylose, vanillate and lignin utilization	Prof. Dennis Gross lab (TAMU)
P. putida B20	Wild type, glucose utilization	Prof. Dennis Gross lab (TAMU)
P. putida Cal-B-10	Wild type, glucose, xylose, vanillate utilization	Prof. Dennis Gross lab (TAMU)
Plasmids		
pPROBE-GT		[7]
pPROBE-TT		[7]
pGVAN	pPROBE-GT derivative, *P. putida* A514 *vanAB*	This study
pPvan	pPROBE-GT derivative, *P. putida* A514 promoter of *vanAB*	This study
pGJ4C1	pPROBE-GT derivative, *P. putida* A514 promoter of *vanAB, phaJ4* and *phaC1*	This study
pGJ4C2	pPROBE-GT derivative, *P. putida* A514 promoter	This study

	of *vanAB, phaJ4* and *phaC2*	
pGPelbDyp2	pPROBE-GT derivative, *P. putida* A514 promoter P1099*, pelb (E. carotovora)* and dyp2 (Amycolatopsis sp. 75iv2)	This study
pGOprIDyp2	pPROBE-GT derivative, *P. putida* A514 promoter P1099*,* OprI, and dyp2 (Amycolatopsis sp. 75iv2)	This study
pGOprFDyp 2	pPROBE-GT derivative, *P. putida* A514 promoter P1099*,* OprF, and dyp2 (Amycolatopsis sp. 75iv2)	This study
pGPbpDyp2	pPROBE-GT derivative, *P. putida* A514 promoter P1099*,* Pbp, and dyp2 (Amycolatopsis sp. 75iv2)	This study
pTP1099	pPROBE-TT derivative, *P. putida* A514 promoter P1099	This study
pGP1099	pPROBE-GT derivative, *P. putida* A514 promoter P1099	This study
pTDV	pPROBE-TT derivative, *P. putida* A514 promoter P1099, *pelb*, *dyp2*, and *vanAB*	This study

Table S4 Hydroxyl functional groups of lignin determined by quantitative ^{31}P NMR after derivatization with TMDP

Functional Group		Integration region (ppm)	Examples	hydroxyl contents/(mmol/g lignin)			
				I[a]	II[b]	III[c]	IV[d]
Aliphatic OH		150.0-145.5		2.03	1.98	2.12	2.01
C_5 substituted condensed Phenolic OH	β-5	144.7-142.92		0.37	0.25	0.22	0.21
	5-5	141.7-140.2		0.57	0.51	0.53	0.51
Guaiacyl phenolic OH		140.2-138.81		1.76	1.58	1.57	1.50
p-hydroxy-phenyl-OH		138.18-137.3		0.23	0.20	0.23	0.21
Carboxylic acid OH		136.6-133.6		0.41	0.42	0.50	0.47

[a] WT cell (A_{vector})
[b] Engineering cell (A_{pelB_DyP2})
[c] Engineering cell (A_{DV})
[d] Engineering cell (A_{DVJ4C1}) + NaOH pretreated

Table S5. GC compositional analysis of medium-chain-length (mcl) PHA produced by recombinant *P. putida* A514 strains.

PHA substrate	Strains	Culture	PHA Composition (mol%)					
			3HHx (C6)	3HO (C8)	3HD (C10)	3HDD (C12)	3HTD (C14)	3HHD (C16)
Vanillate	A_{Pvan}	Low N (65mg/L)	7.06±2.68	19.04±3.48	33±4.52	30.85±1.11	ND	10.05±2.04
	$A_{phaJ4C1}$		3.22± 0.14	30.14±2.7	2.49±0.07	15.13±3.24	ND	49.02±4.45
	$A_{phaJ4C2}$		ND	38.93±2.41	ND	53.06±4.29	ND	8.01±0.21
	A_{Pvan}	High N (1g/L)	ND	ND	34.78±2.91	65.22±1.24	ND	ND
	$A_{phaJ4C1}$		ND	ND	ND	59.30±1.10	38.78±0.87	1.92±0.24
	$A_{phaJ4C2}$		ND	ND	27.02±3.33	ND	72.98±2.64	ND
Lignin	$A_{vectors}$	Low N (65mg/L)	3.36±1.87	ND	ND	96.64±1.87	ND	ND
	A_{DVJ4C1}		4.29±0.63	15.16±2.72	ND	25.66±12.79	54.89±9.92	ND
	$A_{vectors}$	High N (1g/L)	15.32±3.63	19.16±4.32	ND	50.05±5.35	15.46±3.61	ND
	A_{DVJ4C1}		22.64±13.8	5.12±2.21	ND	57.23±5.08	24.12±19.5	ND

3HHx: 3-hydroxyhexanoate; 3HO: 3-hydroxyoctanoate; 3HD: 3-hydroxydecanoate; 3HDD: 3-hydroxydodecanoate; 3HTD: 3-hydroxytetradecanoate; 3HHD: 3-hydroxyhexadecanoate. ND: not detected.