Table S1. *Assignment of IR bands in Figure 3*

Frequency, cm^{-1}	***Material***	***Assignment***	***Ref.***
Bands resulting from C_2H_5COOH adsorption (spectra reported as blue lines)			
1550-1495	TiO_2_P25	$\nu_{asym}COO^-$	***26,27***
1600, 1540	ZrO_2		
1556	TiO_2_Merck		
1600-1500,	CeO_2		
1635, 1576	Al_2O_3		
1450-1400	TiO_2_P25	$\nu_{sym}COO^-$	***26, 27***
1440, 1418	ZrO_2		
1450-1400	TiO_2_Merck		
1425	CeO_2		
1450, 1418	Al_2O_3		
1473	TiO_2_P25, ZrO_2,TiO_2_Merck	δ_{asym} CH_3 + δ_{sym} CH_2	***28***
1468	CeO_2,		
1480	Al_2O_3		
1380	all oxides	δ_{sym} CH_3	***28***
1670	TiO_2_Merck, Al_2O_3	ν C=O, undissociated C_2H_5COOH	***26, 27***
Bands resulting from subsequent adsorption of C_2H_5COOH +$CH_3(CH_2)_4NH_2$ (spectra reported as grey lines)			
1590	TiO_2_P25	νC=O(amide)	***28***
1530	TiO_2_P25	$\nu_{asym}COO^-$	***26, 27***
1600, 1540	ZrO_2		
1616, 1556	TiO_2_Merck		
1600-1500,	CeO_2		
1644, 1635, 1576	Al_2O_3		
1415	TiO_2_P25	$\nu_{sym}COO^-$	***26, 27***
1440, 1418	ZrO_2		
1450-1400	TiO_2_Merck		
1425	CeO_2		
1450, 1418	Al_2O_3		
1560	TiO_2_Merck	δNH_2	***28***
1582	Al_2O_3		
1469	TiO_2_P25,	δ_{asym} CH_3 + δ_{sym} CH_2	***28***
1474	ZrO_2,		
1470	TiO_2_Merck		
1368	CeO_2,		
1471	Al_2O_3		
1380	all oxides	δ_{sym} CH_3	***28***

Table S2. *Assignment of IR bands in Figure 4*

Frequency, cm^{-1}	*Material*	*Assignment*	*Ref.*
Bands resulting from HCOOH adsorption (spectra reported as blue lines)			
1580-1541 **1566** **1598** **1586, 1550,** **1628, 1600**	TiO_2_P25 ZrO_2 TiO_2_Merck CeO_2 Al_2O_3	$\nu_{asym}COO^-$	***18, 26, 27***
1412, 1361 **1370-1316** **1403, 1364** **1371, 1361, 1307** **1391, 1324**	TiO_2_P25 ZrO_2 TiO_2_Merck CeO_2 Al_2O_3	$\nu_{sym}COO^-$	***18, 26, 27***
1385 **1386** **1380**	TiO_2_P25, ZrO_2 TiO_2_Merck CeO_2, Al_2O_3	δO-C-H	***18, 26, 27***
1673 **1675**	TiO_2_Merck Al_2O_3	νC=O, undissociated HCOOH	***18, 26, 27***
Bands resulting from subsequent adsorption of $CH_3(CH_2)_4NH_2$ (spectra reported as grey lines)			
1665, 1634 **1674, 1636** **1665, 1643** **1666, 1629** **1653**	TiO_2_P25 ZrO_2 TiO_2_Merck CeO_2 Al_2O_3	νC=O (amide)	***18, 28***
1589 **1573** **1598** **1603, 1528**	TiO_2_P25 ZrO_2, CeO_2 TiO_2_Merck Al_2O_3	$\nu_{asym}COO^-$, δNH_2	***18, 26, 28***
1469, 1444 **1466, 1447** **1466, 1441** **1464** **1469**	TiO_2_P25 ZrO_2, TiO_2_Merck CeO_2 Al_2O_3	δCH_2, δCH_3	***28***
1361, **1370-1316** **1386, 1364** **1375** **1383, 1300**	TiO_2_P25 ZrO_2 TiO_2_Merck CeO_2 Al_2O_3	$\nu_{sym}COO^-$	***18, 26***

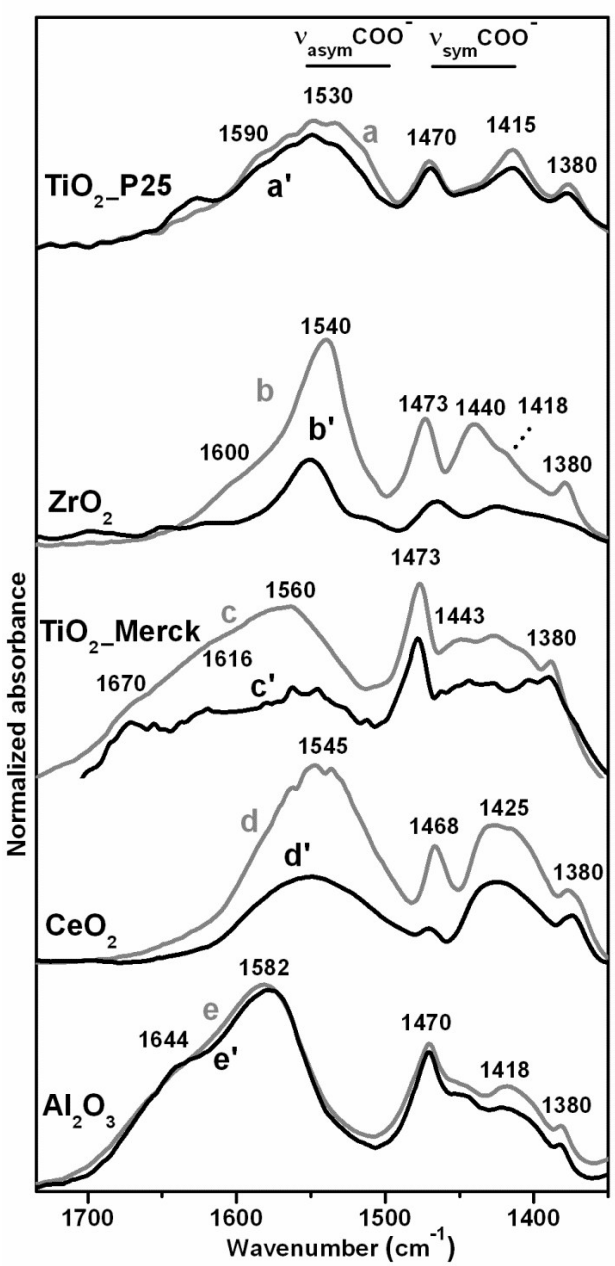

Figure S1. *IR spectra of TiO_2_P25, ZrO_2, TiO_2_Merck, CeO_2, and γ-Al_2O_3 contacted with propanoic acid and 1-pentanamine, outgassed at r.t. (grey lines: a, b, c, d, e) and further heated in static atmosphere at 383K for 30 min (black lines: a', b', c', d', e').*

Table S3. *Integrated intensities of $\nu_{asym}COO^-$ and ν_{sym} COO^- components of HCOOH adsorbed on TiO_2_P25 and TiO_2_Merck (see Figure 5 in the main text).*

Material	***ν_{asym} (COO^-), cm^{-1}***	***Integrated Intensity, cm^{-1}***	***ν_{sym} (COO^-), cm^{-1}***	***Integrated Intensity, cm^{-1}***
TiO_2_P25	1519	5.43	1361	10.19
	1541	8.60	1412	0.28
	1560	4.35		
	1579	11.53		
	1615	5.98		
TiO_2_Merck	1598	29.74	1364	3.90
	1674	12.50	1403	2.07

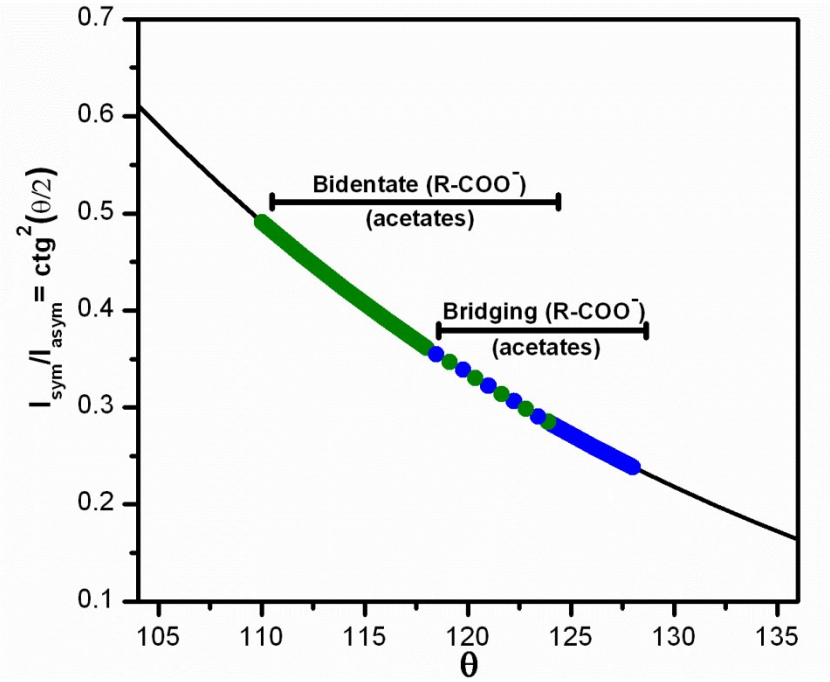

Figure S2. *Dependence of integrated intensities ratio of $I(COO^-_{sym})/I(COO^-_{asym})$ from the O-C-O bond angle of adsorbed COO- species (in green and blue are ranges of angles measured for bidentate and bridging type of carboxylate complexes respectively). [Ref: G.B. Deacon, R.J. Phillips, Coord. Chem. Rev., 1980, 33, 227]*