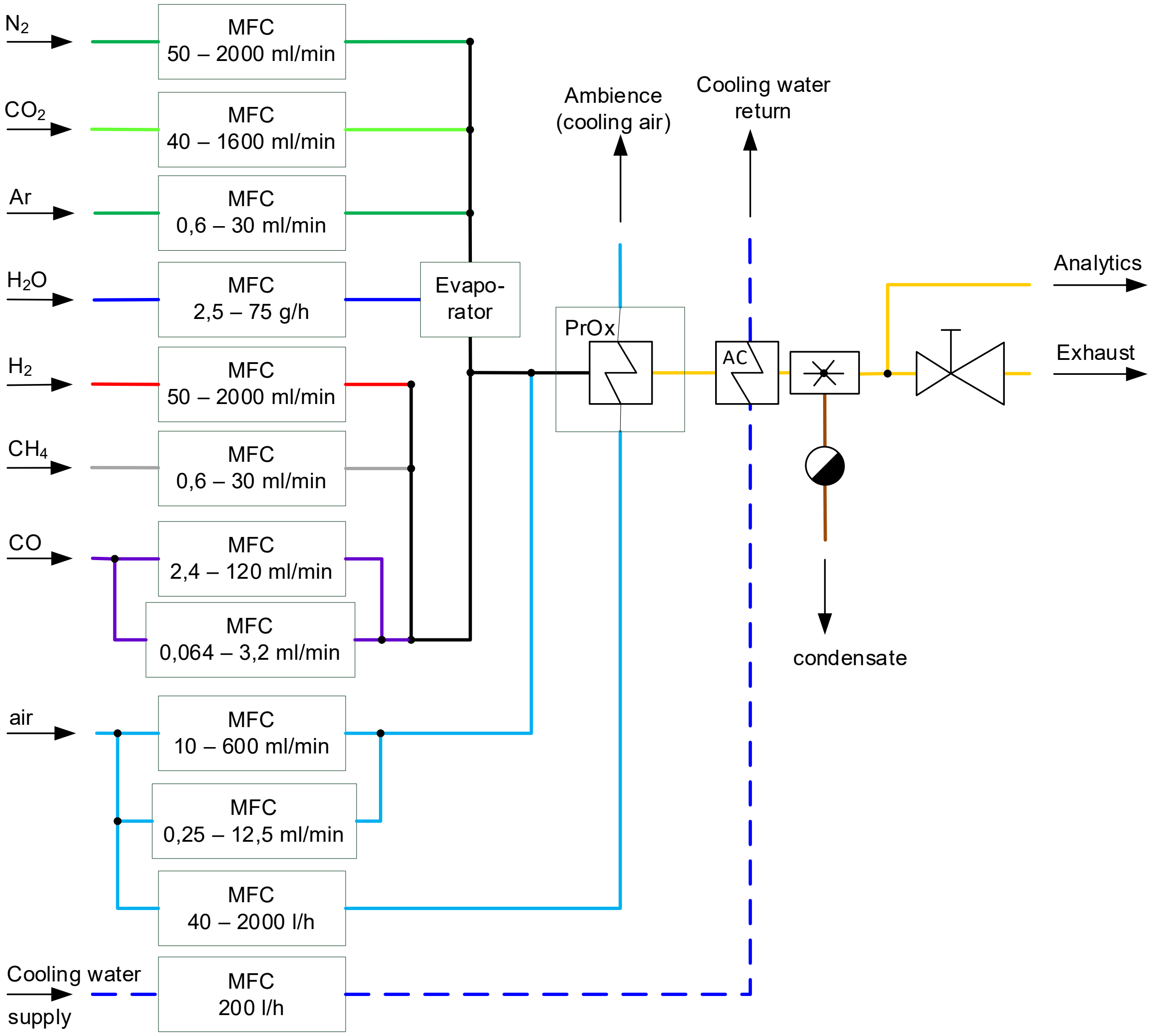

Figure SI1. Simplified block diagram of the test rig

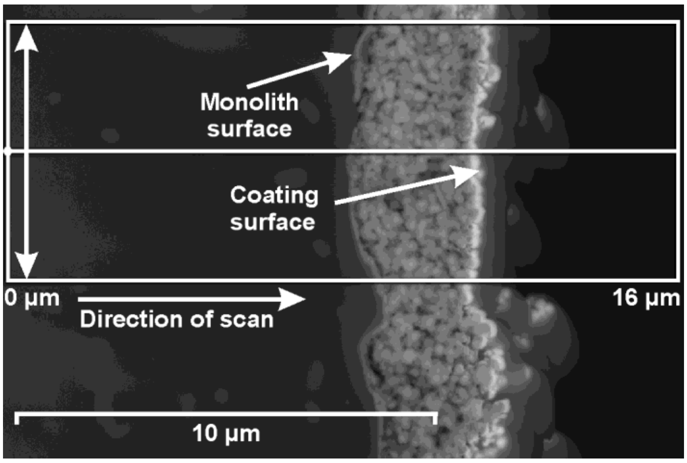

Figure SI2. Overview image of the EDX line scan

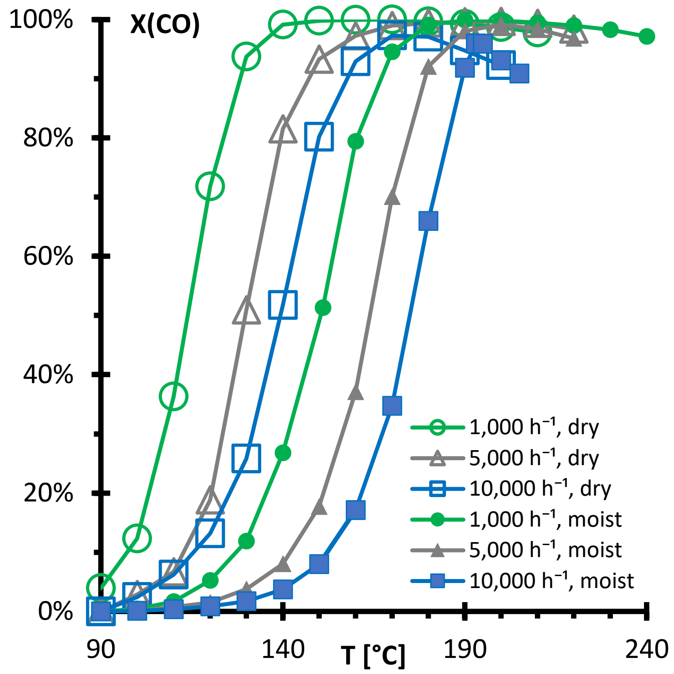

Figure SI3. CO conversion graphs, dry fuel gas (FG1) & moist fuel gas (FG2) with Monolith #2 (CuO/CeO_2), all λ = 2.5, varying GHSV.

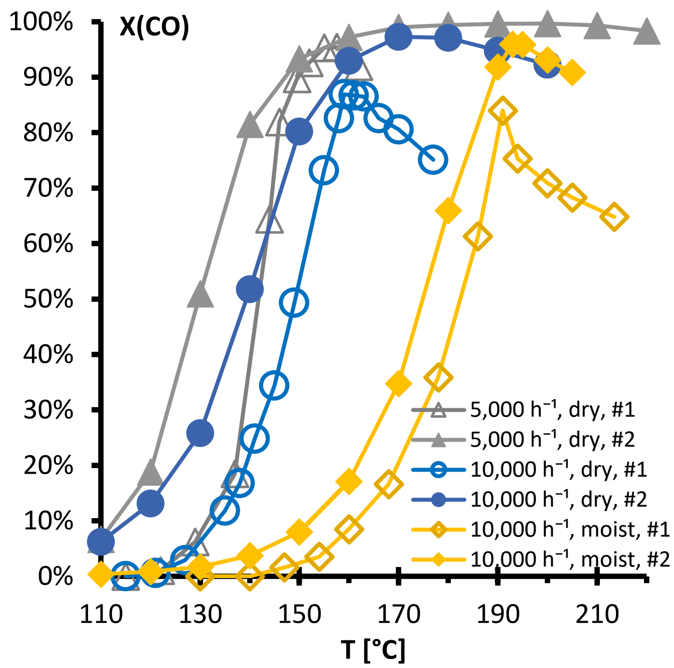

Figure SI4. CO conversion graphs, comparing single coated monolith #1 and double coated monolith #2 (CuO/CeO_2), all λ = 2.5, varying GHSV.

Table SL1. Monoliths overview

composition	Washcoat carrier	preparation/ coating method	layer [µm]	pore size [nm]	coating quantity [mg/cm³]	monolith				Feed [mol.%]						GHSV [h^{-1}]	λ	T [°C]	X(CO) [%]	S(CO) [%]	$X(O_2)$ [%]	Y(CO) [%]	remark	ref.
						support	l [mm]	D [mm]	V [cm³]	H_2	CO_2	H_2O	CO	N_2	O_2									
5 wt.% Pt, 0.5 wt.% Fe	Al_2O_3	dip-coating	15 - 20	-	Al_2O_3: 98 Pt: 4.9 Fe: 0.49	honeycomb ceramic 400 cpsi	50,8	25,4	25.7	42.0	9.0	12.0	1	35 - 35.75	0.25 - 1.0	10000	2.0	100 at inlet	47	40	100	18,8		[1]
unknown, propietary Engelhard Selectra-PROX I	-	-	-	-	-	honeycomb cordierite, 600 cpsi	127	76,2	579	38.4	19.9	16.8	0.2	24.7		18000	1.35			69	100			[2]
0.5 wt.% Pt	Al_2O_3	-	-	-	-	cordierite 600 cpsi	-	-	-	30.0	17.0	15.0	0.003 - 1.0	balance	0.003 - 1.0	-	-	-	-	-	-	-		[3]
0.5 wt.% Pt	γ-Al_2O_3	impregnation	-	-	-	honeycomb cordierite 400 cpsi	-	-	-	40.0	-	20.0	0.8	38.4	0,8	10000	2.0	170	99	50	100	50		[4]
																30000		180	95	61	100	58		
0.5 wt.% Pd																30000		240-280	25	12	100	3		
0.5 wt.% Rh																30000		120-150	68	35	100	24		
0.5 wt.% Ru																30000		130	52	27	100	14		
0.1 wt.% Pt	12 % γ-Al_2O_3	dip-coating slurry-sol-slurry	-	-	-	honeycomb metallic Fe-20Cr-5Al 400 cpsi	-	-	-	39.6	19.8	16.5	1.0	22.1	1.0	10000	2.0	198-206	96	47,5	-	46		[5]
4 wt.% Pt, 0.5 wt.% Fe, Mordenite	-	dip-coating	14		100	honeycomb cordierite, 400 cpsi	15	12	1.70	63.0	20.0	15.0	1.0	-	1.0	9500	2.0	100-150	99,95	50	100	50,0		[6]
15 mol.% Cu, 85 mol.% Ce	Al_2O_3	dip-coating	-	-	-	honeycomb metallic Fe-20Cr-5Al 400 cpsi	15	7	0.577	50.0	7.5	10.0	0.5	31.5	0.5		2.0	165-185	100	70	100	70,0		[7]
15 mol.% Cu, 8.5 mol.% Nd, 76.5 mol.% Ce			-	-	-													165-205	100	70		70,0		
15 mol.% Cu, 8.5 mol.% Zr, 76.5 mol.% Ce			-	-	-													165-205	100	75		75,0		
4 wt.% Pt, 0.5 wt.% Fe, Mordenite	-	dip-coating alumina-sol	-	-	100	honeycomb cordierite, 400 cpsi	15	12	1.70	73.0	20.0	5.0	1.0	-	1.0	9500	2.0	130	99.9	-	-	0.0	after 200 h H_2O-tolerance durability test	[8]
		dip-coating silica-sol			100	honeycomb cordierite, 400 cpsi												100	99.8	-	-	0.0		
2 wt.% Pt, Z-PM zeolith	-	impregnation, dip-coating	50 - 75	-	50	honeycomb cordierite, 225 cpsi	-	-	-	97.5	-	-	1.0	-	1.5	225000	3.0	100-150	65	>50	-	-	coating quantity approximated	[9]
2 wt.% Pt,SiO_2																		250	82	52	-	-		
1 wt.% Pt	γ-Al_2O_3	impregnation	-	3.8	-	macro-porous Al_2O_3	-	-	-	50.0	-	-	1.0	48.0	1.0	20000	2.0	225-250	99.6	42	100	41.8		[10]
1 wt.% Pt, 2 wt.% K	γ-Al_2O_3		-	3.0	-													200-250	>99	42	100	41.6	molar ratio K/Pt = 10	
1 wt.% Pt, 1.5 wt.% Ni	γ-Al_2O_3	impregnation	-	-	-	macro-porous Al_2O_3	-	-	-	50.0	12.5	15.0	1.0	20.5	1.0	16000	2.0	140-180	>99	51	-	51		[11]
CuO-CeO_2 (6.8 wt.% Cu)	-	impregnation	9	4.5	-	honeycomb cordierite, 400 cpsi	21	9	1.34	42.0	15.0	15.0	0.7	He 26.6	0.7	9000	2.0	135-158	100	-	-	-	Cu/Ce-ratio=0.13	[12]
CuO-CeO_2 (8.6 wt.% Cu)			12	4.4	-													128-144	100	-	-	-	Cu/Ce-ratio=0.17	
M1 Co-ZrO_2 (15.9 wt.% Co)	ZrO_2	impregnation	-	-	41	honeycomb cordierite, 400 cpsi	20	10x10	2.00	40.0	-	-	1.0	He 58.0	1.0	-	2.0	250-260	70	-	-	-	slurry ZrO_2, 10wt.%/HAc	[13]
M2 Co-ZrO_2 (12.1 wt.% Co)			-	-	35													-	-	-	-	-	slurry ZrO_2, 10wt.%/H_2O	
M3 Co-ZrO_2 (11.1 wt.% Co)			-	-	40													250-260	85	-	-	-	slurry ZrO_2, 20wt.%/HAc	
M3* Co-ZrO_2 (21.5 wt.% Co)			-	-	38													240	90	-	-	-	slurry ZrO_2, 20wt.%/HAc	
M4 Co-ZrO_2 (10.6 wt.% Co)			-	-	76													220-250	>90	-	-	-	slurry NYACOL(ZrO_2), stability test 100h	
M5 Co-ZrO_2 (10.6 wt.% Co)			-	-	55													240-260	85	-	-	-	slurry ZrO_2, 20wt.%/NYACOL(ZrO_2)	
M6 Co-ZrO_2 (6.9 wt.% Co)			-	-	66													-	-	-	-	-	slurry NYACOL(Al_2O_3)-ZrO_2 20 wt.%/HAc	
C1 Co-CeO_2 (11.2 wt.% Co)	CeO_2	impregnation	-	-	23	honeycomb cordierite, 400 cpsi	20	10x10	2.00	40.0	-	-	1.0	He 58.0	1.0	-	2.0	200-210	98	-	-	-	coating quantity calculated	[14]
C2 Co-CeO_2 (10.1 wt.% Co)			-	-	53													200-210	95	-	-	-		
C3 Co-CeO_2 (10.0 wt.% Co)			-	-	23													200-210	98	-	-	-		
0.02 wt.% Pt, 4.5 wt.% CuO	CeO_2	SFRD	-	-	-		-	-	-	41.0	-	-	0.5	58.0	0.5	-	2.0	150	>90	-	-	-		[15]

						monolith				Feed [mol.%]														
composition	Washcoat carrier	preparation/ coating method	layer [µm]	pore size [nm]	coating quantity [mg/cm³]	support	l [mm]	D [mm]	V [cm³]	H_2	CO_2	H_2O	CO	N_2	O_2	GHSV [h^{-1}]	λ	T [°C]	X(CO) [%]	S(CO) [%]	X(O_2) [%]	Y(CO) [%]	remark	ref.
0.01 wt.% Pt, 2.0 wt.% CuO	CeO_2	SFRD				α-Al_2O_3-foam, 20 ppi												140-150	>90	-	-	-	SFRD supercritical fluid reactive deposition	
0.03 wt.% Pt, 5.8 wt.% CuO	CeO_2	SFRD																90-150	<60	-	-	-		
1.0 wt.% Au, 1.25 wt.% MgO	Al_2O_3	homogenous deposition-precipitation (urea)	-	-	-	honeycomb cordierite	20	11	1.90	61.7	-	-	1.0	He 36.3	1.0	-	3.2	90	60	-	-	-		[16]
Pt-promoted CuFe-catalyst*	Al_2O_3	impregnation	-	-	-	honeycomb cordierite, 400 cpsi	76.2	19.1	21.7	45.7	17.5	25.0	0.222	11.4	0.222	24000	2.0	70-150	>96	>50	-	>48	propietary	[17]
CuO_x-CeO_2 (14 mol.% Cu, 86 mol.% Ce)	enamel	coprecipitation	-	8	103	enameled steel monolith	30	17	6.81	50.0	-	-	1.0	48.0	1.0	7000	2.0	170-200	>99	-	-	-		[18]
CuO_x-CeO_2 (4.2 wt.% CuO)	-	wet impregnation, dip-coating	12-15	-	230	honeycomb cordierite, 900 cpsi	12	16	2.41	50.0	- 15	- 10	0.5	48.6 23.6	0.9	-	3.6	90-120 145	>95 >90	30-60 <30	- -	30-60 <30		[19]
2 wt.% Au/TiO_2		incipient wetness impregnation			23.0	anodized Al- monolith	15	14	2.31				composition not given			1040	3.0	80-110	50	<20	-	<10		[20]
CuO_x-CeO_2 (4.2 wt.% CuO), S1-M		wet impregnation, dip-coating	15			honeycomb cordierite, 400 cpsi	12	16	2.41	50.0	-	-	0.5	23.6	0.9		3.6	140-200	>99	28-62	-	28-80		
CuO_x-CeO_2 (4.2 wt.% CuO), S2-M		wet impregnation, dip-coating	15			honeycomb cordierite, 400 cpsi	12	16	2.41	50.0	-	-	0.5	23.6	0.9		3.6	160-180	>99	33-48	-	28-80		
CuO_x-CeO_2 (4.2 wt.% CuO), S3-M		wet impregnation, dip-coating	15			honeycomb cordierite, 400 cpsi	12	16	2.41	50.0	-	-	0.5	23.6	0.9		3.6	140-200	>99	28-78	-	28-80		[21]
CuO_x-CeO_2 (4.2 wt.% CuO), S5-M		wet impregnation, dip-coating	15			honeycomb cordierite, 400 cpsi	12	16	2.41	50.0	-	-	0.5	23.6	0.9		3.6	130-200	>99	28-87	-	28-80		
CuO_x-CeO_2 (4.2 wt.% CuO), S6-M		wet impregnation, dip-coating	15			honeycomb cordierite, 400 cpsi	12	16	2.41	50.0	-	-	0.5	23.6	0.9		3.6	200	98	31	-	28-80		
CuO (4.8 wt.% Cu)	CeO_2	wet impregnation, dip-coating			28.9	3d-printed resin	10	15	1.77	30.0	-	-	2.0	He 66.0	2.0	2000	2.0	135	95	90	-	86	10 h experiment	[22]
CuO-CeO_2 /celite (CuO 4.6 wt.%, CeO_2 18.7 wt.%, Cu/Ce=0.55)		co-impregnation, dip-coating	20-30		46	honeycomb cordierite, 400 cpsi	10	10x10	1.0									150-185	>98					
CuO-CeO_2 /aerosil (CuO 4.9 wt.%, CeO_2 18.9 wt.%, Cu/Ce=0.55)		co-impregnation, dip-coating	20-30		47													185	91					[23]
CuO-CeO_2 /SBA-15 (CuO 4.9 wt.%, CeO_2 19.1 wt.%, Cu/Ce=0.55)		co-impregnation, dip-coating	20-30		48													185	85					

References Supplementary Table1 Monoliths overview

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