

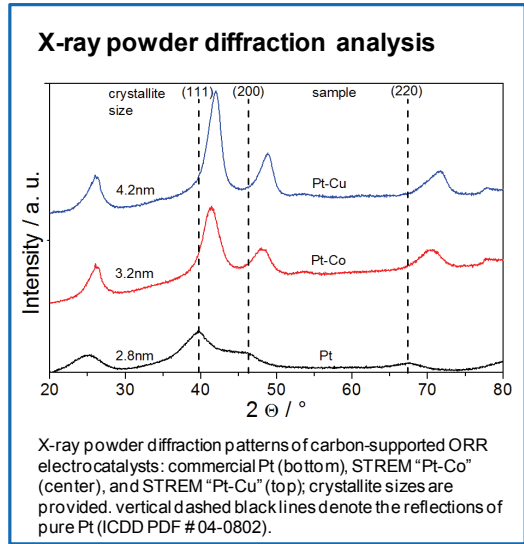


Dealloyed Pt-Co and Pt-Cu Core-Shell Fuel Cell Catalyst

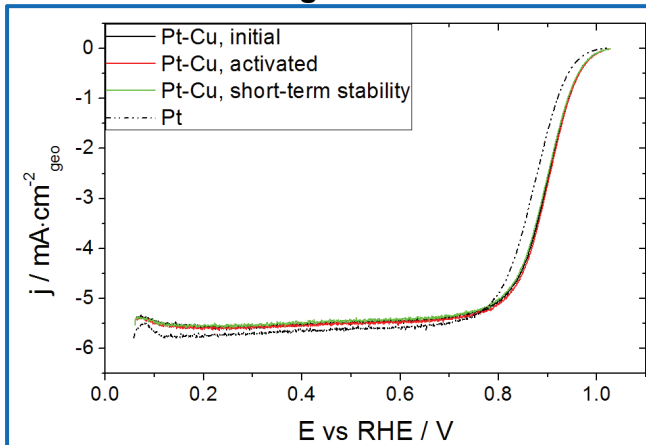
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Dealloyed carbon-supported “Pt-Co” and “Pt-Cu” core-shell PEM Fuel Cell electrocatalysts consist of bimetallic nanoparticles with a nm-thick pure Pt particle shell surrounding a PtCo and PtCu particle core. This unique compositional structure results in high electrochemical activity for the cathodic Oxygen Reduction Reaction (ORR) under fuel cell-relevant conditions.

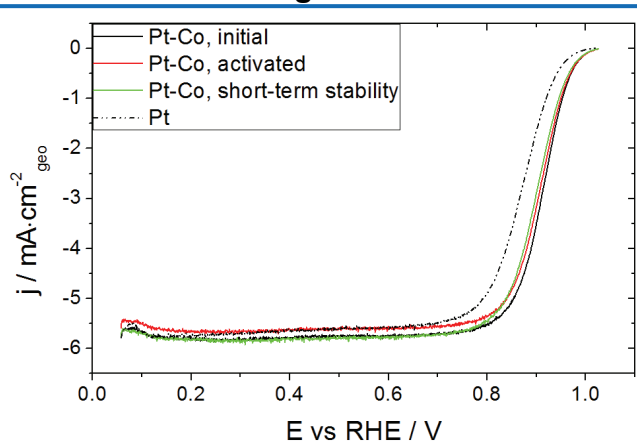
Catalyst	Pt:M (at%:at%)	Pt loading (Pt wt %)	M loading (M wt %)	Total (Pt+M wt %)
Catalog # 78-1685				
Pt-Co	2:1	21.5	3.1	24.6
Catalog # 78-1688				
Pt-Cu	1:1	21.1	6.3	27.4



Catalog #78-1688



Catalog # 78-1685



Linear sweep voltammetry (LSV) of Dealloyed STREM “Pt-Co” and STREM “Pt-Cu” after voltammetric cycling (initial, activated, after short-term stability), compared to a state-of-art 20 wt% Pt benchmark electrocatalysts; Tafel plots (insets) demonstrate a dramatic enhancement in catalytic activity for oxygen reduction for the dealloyed bimetallic nanoparticle catalysts.

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Strem Chemicals, Inc.
7 Mulliken Way
Newburyport, MA 01950-4098
U.S.A.
Tel.: (978) 499-1600
Fax: (978) 465-3104
Email: info@strem.com

Strem Chemicals, Inc.
15, rue de l'Atome
Zone Industrielle
67800 BISCHHEIM France
Tel.: (33) 03 88 62 52 60
Fax: (33) 03 88 62 26 81
Email: info.europe@strem.com

Strem Chemicals, Inc.
Postfach 1215
77672 KEHL
Germany
Telefon: 0 78 51/ 7 58 79
Email: info.europe@strem.com

Strem Chemicals UK Ltd.
Newton Hall, Town Street
Newton, Cambridge
England CB22 7ZE
Tel.: 0845 643 7263
Fax: 0845 643 7362
Email: enquiries@strem.co.uk

Electrochemical ORR activity of dealloyed “Pt-Co“and „Pt-Cu“ catalysts

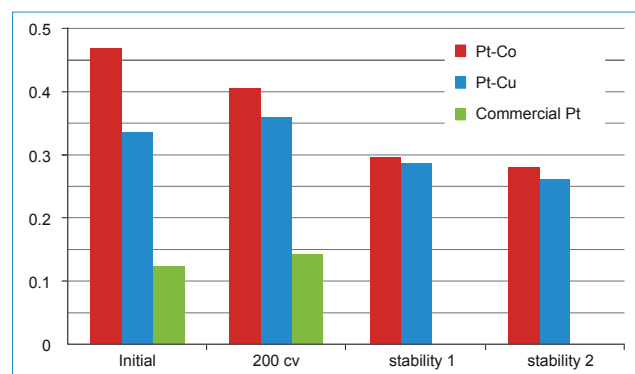
(Mass Activity j_m [A/mg_{Pt}]; Specific Activity j_{spec} [μ A/cm²_{Pt}]; Electrochemical Surface Area ECSA [m²/g_{Pt}])

	state	j_m [A/mg _{Pt}]		j_{spec} [μ A/cm ² _{Pt}]		ECSA [m ² /g _{Pt}]	
20 wt% Pt	activated	0.142	0.025	368.64	23.12	38.6	1.3
	initial	0.468	0.061	1288.47	17.75	36.3	4.7
Pt-Co	activated	0.406	0.039	1012.50	54.77	40.0	2.1
	stability 1*	0.297	0.029	932.36	100.80	39.2	6.6
	stability 2*	0.281	0.056	704.67	61.58	39.6	6.1
	initial	0.336	0.057	1151.26	105.63	28.9	2.6
Pt-Cu	activated	0.366	0.054	1132.16	87.96	32.1	2.7
	stability 1*	0.287	0.026	999.22	1.38	28.7	2.6
	stability 2*	0.262	0.036	850.40	59.64	30.6	5.2
	initial	0.336	0.057	1151.26	105.63	28.9	2.6

* stability 1 and 2 represent activity after short-term and long-term testing, respectively

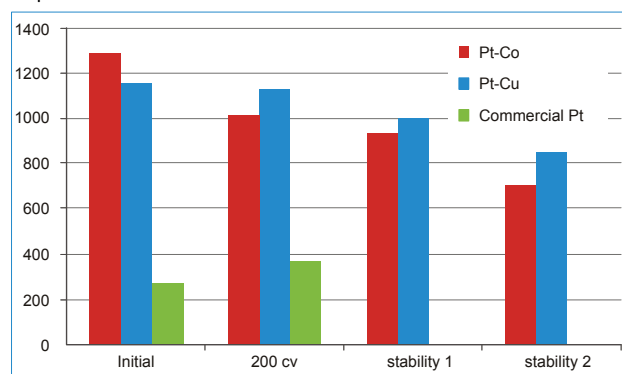
Mass Activities of Pt-Co and Pt-Cu

j_m [A/mg_{Pt}];



Specific Activities of Pt-Co and Pt-Cu

j_{spec} [μ A/cm²_{Pt}];



Pt mass-based and Pt surface area specific ORR activities for dealloyed STREM “Pt-Co” and “Pt-Cu” and state-of-the-art Pt catalyst after potential cycling treatments.

Reference:

„Activity of dealloyed PtCo₃ and PtCu₃ nanoparticle electrocatalyst for oxygen reduction reaction in polymer electrolyte membrane fuel cell“
Oezaslan, Mehtap; Strasser, Peter; *Journal of Power Sources* 196 (2011) 5240–5249

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Strem Chemicals, Inc.
7 Mulliken Way
Newburyport, MA 01950-4098
U.S.A.
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Email: info@strem.com

Strem Chemicals, Inc.
15, rue de l'Atome
Zone Industrielle
67800 BISCHHEIM France
Tel.: (33) 03 88 62 52 60
Fax: (33) 03 88 62 26 81
Email: info.europe@strem.com

Strem Chemicals, Inc.
Postfach 1215
77672 KEHL
Germany
Telefon: 0 78 51/ 7 58 79
Email: info.europe@strem.com

Strem Chemicals UK Ltd.
Newton Hall, Town Street
Newton, Cambridge
England CB22 7ZE
Tel.: 0845 643 7263
Fax: 0845 643 7362
Email: enquiries@strem.co.uk