Misconceptions and challenges in methane-to-methano zeolites

Nature Catalysis

2, 485-494

DOI: 10.1038/s41929-019-0273-z

#	Article	IF	Citations
1	Mechanistic Insights on the Direct Conversion of Methane into Methanol over Cu/Naâ€“ZSM-5 Zeolite: Evidence from EPR and Solid-State NMR. ACS Catalysis, 2019, 9, 8677-8681.	5.5	29
2	Water Molecules Facilitate Hydrogen Release in Anaerobic Oxidation of Methane to Methanol over Cu/Mordenite. ACS Catalysis, 2019, 9, 10365-10374.	5.5	34
3	Continuous Partial Oxidation of Methane to Methanol Catalyzed by Diffusion-Paired Copper Dimers in Copper-Exchanged Zeolites. Journal of the American Chemical Society, 2019, 141, 11641-11650.	6.6	191
4	Mechanism of oxide-catalyzed selective oxidation: A computational perspective. Annual Reports in Computational Chemistry, 2019, 15, 287-333.	0.9	5
5	Direct and Selective Photocatalytic Oxidation of CH₄ to Oxygenates with O₂ on Cocatalysts/ZnO at Room Temperature in Water. Journal of the American Chemical Society, 2019, 141, 20507-20515.	6.6	253
6	Identifying Cu-oxo species in Cu-zeolites by XAS: A theoretical survey by DFT-assisted XANES simulation and EXAFS wavelet transform. Catalysis Today, 2020, 345, 125-135.	2.2	68
7	Kinetic study and effect of water on methane oxidation to methanol over copper-exchanged mordenite. Catalysis Science and Technology, 2020, 10, 382-390.	2.1	30
8	Conversion of Methane into Liquid Fuelsâ€"Bridging Thermal Catalysis with Electrocatalysis. Advanced Energy Materials, 2020, 10, 2002154.	10.2	57
9	Applications of Zeolites to C1 Chemistry: Recent Advances, Challenges, and Opportunities. Advanced Materials, 2020, 32, e2002927.	11.1	165
10	Low Temperature Activation of Methane on Metal-Oxides and Complex Interfaces: Insights from Surface Science. Accounts of Chemical Research, 2020, 53, 1488-1497.	7.6	66
11	Selective Photo-oxidation of Methane to Methanol with Oxygen over Dual-Cocatalyst-Modified Titanium Dioxide. ACS Catalysis, 2020, 10, 14318-14326.	5.5	114
12	Novel Mechanistic Insights into Methane Activation over Fe and Cu Active Sites in Zeolites: A Comparative DFT Study Using Meta-GGA Functionals. Journal of Physical Chemistry C, 2020, 124, 18112-18125.	1.5	24
13	Design of Organic/Inorganic Hybrid Catalysts for Energy and Environmental Applications. ACS Central Science, 2020, 6, 1916-1937.	5.3	38
14	Methane Borylation Catalyzed by Ru, Rh, and Ir Complexes in Comparison with Cyclohexane Borylation: Theoretical Understanding and Prediction. Journal of the American Chemical Society, 2020, 142, 16732-16747.	6.6	21
15	On the Electronic Origins of the Different Behaviors of S⁺ and S₂^{+/2+} in Methane Activation. ChemistrySelect, 2020, 5, 12764-12769.	0.7	4
16	Exploring the Tunability of Trimetallic MOF Nodes for Partial Oxidation of Methane to Methanol. ACS Applied Materials & Interfaces, 2020, 12, 28217-28231.	4.0	46
17	Methane Utilization to Methanol by a Hybrid Zeolite@Metalâ€“Organic Framework. ACS Applied Materials & Interfaces, 2020, 12, 23812-23821.	4.0	32
18	Thermodynamics of Waterâ€“Cationic Speciesâ€“Framework Guestâ€“Host Interactions within Transition Metal Ion-Exchanged Mordenite Relevant to Selective Anaerobic Oxidation of Methane to Methanol. Journal of Physical Chemistry Letters, 2020, 11, 4774-4784.	2.1	8

#	Article	IF	Citations
19	EXAFS wavelet transform analysis of Cu-MOR zeolites for the direct methane to methanol conversion. Physical Chemistry Chemical Physics, 2020, 22, 18950-18963.	1.3	35
20	Boosting the activity of transition metal carbides towards methane activation by nanostructuring. Physical Chemistry Chemical Physics, 2020, 22, 7110-7118.	1.3	18
21	Highâ€Valent Metalâ€“Oxo Species at the Nodes of Metalâ€“Triazolate Frameworks: The Effects of Ligand Exchange and Twoâ€State Reactivity for Câˆ'H Bond Activation. Angewandte Chemie - International Edition, 2020, 59, 19494-19502.	7.2	14
22	Highâ€Valent Metalâ€“Oxo Species at the Nodes of Metalâ€“Triazolate Frameworks: The Effects of Ligand Exchange and Twoâ€State Reactivity for Câˆ'H Bond Activation. Angewandte Chemie, 2020, 132, 19662-19670.	1.6	9
23	Active sites and mechanisms in the direct conversion of methane to methanol using Cu in zeolitic hosts: a critical examination. Chemical Society Reviews, 2020, 49, 1449-1486.	18.7	170
24	Comparing the Nature of Active Sites in Cu-loaded SAPO-34 and SSZ-13 for the Direct Conversion of Methane to Methanol. Catalysts, 2020, 10, 191.	1.6	16
25	Mechanism of Ir-catalyzed hydrogenation: A theoretical view. Coordination Chemistry Reviews, 2020, 412, 213251.	9.5	33
26	Nature of the Surface Intermediates Formed from Methane on Cu-ZSM-5 Zeolite: A Combined Solid-State Nuclear Magnetic Resonance and Density Functional Theory Study. Journal of Physical Chemistry C, 2020, 124, 6242-6252.	1.5	38
27	Catalyst screening for the oxidative coupling of methane: from isothermal to adiabatic operation <i>via</i> microkinetic simulations. Reaction Chemistry and Engineering, 2020, 5, 584-596.	1.9	16
28	Cu-Erionite Zeolite Achieves High Yield in Direct Oxidation of Methane to Methanol by Isothermal Chemical Looping. Chemistry of Materials, 2020, 32, 1448-1453.	3.2	33
29	Selective activation of methane C H bond in the presence of methanol. Journal of Catalysis, 2020, 386, 12-18.	3.1	6
30	A review on advanced catalytic co-pyrolysis of biomass and hydrogen-rich feedstock: Insights into synergistic effect, catalyst development and reaction mechanism. Bioresource Technology, 2020, 310, 123457.	4.8	130
31	Influence of Cu-speciation in mordenite on direct methane to methanol conversion: Multi-Technique characterization and comparison with NH3 selective catalytic reduction of NOx. Catalysis Today, 2021, 369, 105-111.	2.2	14
32	Confining isolated atoms and clusters in crystalline porous materials forÂcatalysis. Nature Reviews Materials, 2021, 6, 244-263.	23.3	219
33	Direct piezocatalytic conversion of methane into alcohols over hydroxyapatite. Nano Energy, 2021, 79, 105449.	8.2	29
34	Metal phenanthroline-based porous polymeric hybrid catalysts for direct conversion of methane. Journal of Porous Materials, 2021, 28, 487-493.	1.3	0
35	Electrocatalytic methane oxidation on Co3O4- incorporated ZrO2 nanotube powder. Applied Catalysis B: Environmental, 2021, 283, 119653.	10.8	33
36	Selective methanol formation<i>via</i>CO-assisted direct partial oxidation of methane over copper-containing CHA-type zeolites prepared by one-pot synthesis. Green Chemistry, 2021, 23, 2148-2154.	4.6	11

#	ARTICLE	IF	CITATIONS
37	Activation and conversion of alkanes in the confined space of zeolite-type materials. Chemical Society Reviews, 2021, 50, 8511-8595.	18.7	87
38	Surface characterization and methane activation on SnO_{<i>x</i>}/Cu₂O/Cu(111) inverse oxide/metal catalysts. Physical Chemistry Chemical Physics, 2021, 23, 17186-17196.	1.3	10
39	Water enables mild oxidation of methane to methanol on gold single-atom catalysts. Nature Communications, 2021, 12, 1218.	5.8	138
40	Bridging adsorption analytics and catalytic kinetics for metal-exchanged zeolites. Nature Catalysis, 2021, 4, 144-156.	16.1	27
41	Exploring the Size Effect of Pt Nanoparticles on the Photocatalytic Nonoxidative Coupling of Methane. ACS Catalysis, 2021, 11, 3352-3360.	5.5	66
42	Design and tailoring of advanced catalytic process for light alkanes upgrading. EcoMat, 2021, 3, e12095.	6.8	10
43	Identifying Opportunities to Promote Systems Thinking in Catalysis Education. Journal of Chemical Education, 2021, 98, 1583-1593.	1.1	4
44	Highly Selective Oxidation of Methane into Methanol over Cu-Promoted Monomeric Fe/ZSM-5. ACS Catalysis, 2021, 11, 6684-6691.	5.5	73
45	Confinement effects and acid strength in zeolites. Nature Communications, 2021, 12, 2630.	5.8	90
46	Direct oxidation of methane to oxygenates on supported single Cu atom catalyst. Applied Catalysis B: Environmental, 2021, 285, 119827.	10.8	72
47	Identifying and Engineering Active Sites at the Surface of Porous Single-Crystalline Oxide Monoliths to Enhance Catalytic Activity and Stability. CCS Chemistry, 2022, 4, 1441-1451.	4.6	6
48	H₂Oâ€Built Proton Transfer Bridge Enhances Continuous Methane Oxidation to Methanol over Cuâ€BEA Zeolite. Angewandte Chemie - International Edition, 2021, 60, 16634-16640.	7.2	29
49	Water-involved methane-selective catalytic oxidation by dioxygen over copper zeolites. CheM, 2021, 7, 1557-1568.	5.8	63
50	Identification of Kinetic and Spectroscopic Signatures of Copper Sites for Direct Oxidation of Methane to Methanol. Angewandte Chemie - International Edition, 2021, 60, 15944-15953.	7.2	33
51	Confinement in a Zeolite and Zeolite Catalysis. Accounts of Chemical Research, 2021, 54, 2894-2904.	7.6	159
52	Copper-Oxo Active Sites for Methane Câ€"H Activation in Zeolites: Molecular Understanding of Impact of Methane Hydroxylation on UVâ€"Vis Spectra. Inorganic Chemistry, 2021, 60, 8489-8499.	1.9	11
53	Identification of Kinetic and Spectroscopic Signatures of Copper Sites for Direct Oxidation of Methane to Methanol. Angewandte Chemie, 2021, 133, 16080-16089.	1.6	0
54	H 2 Oâ€Built Proton Transfer Bridge Enhances Continuous Methane Oxidation to Methanol over Cuâ€BEA Zeolite. Angewandte Chemie, 2021, 133, 16770-16776.	1.6	5

#	Article	IF	Citations
55	Effect of Lanthanum Ions on the BrÃ¸nsted Acidity of Faujasite and Implications for Hydrothermal Stability. Journal of Physical Chemistry C, 2021, 125, 13649-13657.	1.5	10
56	Thermodynamics Perspective on the Stepwise Conversion of Methane to Methanol over Cu-Exchanged SSZ-13. ACS Catalysis, 2021, 11, 7719-7734.	5.5	31
57	Distinct Behaviors of Cu- and Ni-ZSM-5 Zeolites toward the Post-activation Reactions of Methane. Journal of Physical Chemistry C, 2021, 125, 19333-19344.	1.5	6
58	Supercritical ion exchange: A new method to synthesize copper exchanged zeolites. Journal of Supercritical Fluids, 2022, 179, 105417.	1.6	6
59	DFT Analysis of Methane Câˆ'H Activation and Overâ€Oxidation by [Cu₂O]²⁺ and [Cu₂O₂]²⁺ Sites in Zeolite Mordenite: Intraâ€•versus Interâ€site Overâ€Oxidation. ChemPhysChem, 2021, 22, 2517-2525.	1.0	2
60	Mechanism investigation and product selectivity control on CO-assisted direct conversion of methane into C1 and C2 oxygenates catalyzed by zeolite-supported Rh. Applied Catalysis B: Environmental, 2022, 300, 120742.	10.8	18
61	Identifying key mononuclear Fe species for low-temperature methane oxidation. Chemical Science, 2021, 12, 3152-3160.	3.7	49
62	Phosphine ligands as protecting groups for 3d complexes in oxidation by O2. Polyhedron, 2020, 186, 114609.	1.0	4
63	Representing the Methane Oxidation Reaction via Linking First-Principles Calculations and Experiment with Graph Theory. Journal of Physical Chemistry Letters, 2021, 12, 558-568.	2.1	7
64	Advances in Catalytic Applications of Zeoliteâ€Supported Metal Catalysts. Advanced Materials, 2021, 33, e2104442.	11.1	113
65	Challenges for the utilization of methane as a chemical feedstock. Mendeleev Communications, 2021, 31, 584-592.	0.6	18
66	Identifying the crucial role of water and chloride for efficient mild oxidation of methane to methanol over a [Cu2(Î¼-O)]2+-ZSM-5 catalyst. Journal of Catalysis, 2022, 405, 1-14.	3.1	19
67	Unraveling the Nature of Extraframework Catalytic Ensembles in Zeolites: Flexibility and Dynamics of the Copper-Oxo Trimers in Mordenite. Journal of Physical Chemistry Letters, 2021, 12, 10906-10913.	2.1	8
68	Synthesis of hierarchical Fe2O3/ZSM-5 from natural minerals as catalyst in partial oxidation of bio-methane. IOP Conference Series: Materials Science and Engineering, 2020, 902, 012047.	0.3	0
69	Lanthanum modified Fe-ZSM-5 zeolites for selective methane oxidation with H₂O₂. Catalysis Science and Technology, 2021, 11, 8052-8064.	2.1	11
70	Atomic Structure of Cu Centers in Mordenite Formed by Interaction of Copper Chloride with H-MOR Zeolite and Temperature Treatment. Journal of Physical Chemistry C, 2021, 125, 25867-25878.	1.5	7
71	Tailoring Electronâ€Riched Boron Sites in BCN for Nitrogen Fixation via Alternate Mechanism. Advanced Materials Interfaces, 2022, 9, .	1.9	9
72	Catalytic properties of the ferryl ion in the solid state: a computational review. Catalysis Science and Technology, 2022, 12, 3069-3087.	2.1	1

#	Article	IF	Citations
73	Identifying hydroxylated copper dimers in SSZ-13 <i>via</i> UV-vis-NIR spectroscopy. Catalysis Science and Technology, 2022, 12, 2744-2748.	2.1	7
74	Oxo dicopper anchored on carbon nitride for selective oxidation of methane. Nature Communications, 2022, 13, 1375.	5.8	98
75	Dynamics of water within Cu-loaded zeolites: A quasielastic neutron scattering study. Catalysis Communications, 2022, 165, 106429.	1.6	1
76	Au decorated Pd nanowires for methane oxidation to liquid C1 products. Applied Catalysis B: Environmental, 2022, 308, 121223.	10.8	20
77	Binary Auâ€"Cu Reaction Sites Decorated ZnO for Selective Methane Oxidation to C1 Oxygenates with Nearly 100% Selectivity at Room Temperature. Journal of the American Chemical Society, 2022, 144, 740-750.	6.6	102
78	Selective CH₄ Partial Photooxidation by Positively Charged Metal Clusters Anchored on Carbon Aerogel under Mild Conditions. Nano Letters, 2021, 21, 10368-10376.	4.5	21
79	Dynamic Evolution of Zeolite Framework and Metal-Zeolite Interface. ACS Catalysis, 2022, 12, 5060-5076.	5.5	36
80	Conversion of CH₄ Catalyzed by Gas Phase Ions Containing Metals. Chemistry - A European Journal, 2022, 28, e202200062.	1.7	5
81	Dynamic Binuclear Cu^{II} Sites in the Reduction Half-Cycle of Low-Temperature NH₃â€"SCR over Cu-CHA Catalysts. ACS Catalysis, 2022, 12, 5263-5274.	5.5	19
82	AuPd nanoparticle-decorated ultrathin Bi₂TiO₄F₂ sheets for photocatalytic methane oxidation. New Journal of Chemistry, 2022, 46, 10545-10549.	1.4	1
83	Selective oxidation of methane to methanol and methyl hydroperoxide over palladium modified MoO₃ photocatalyst under ambient conditions. Catalysis Science and Technology, 2022, 12, 3727-3736.	2.1	9
85	Single Atom Catalysts for Selective Methane Oxidation to Oxygenates. ACS Nano, 2022, 16, 8557-8618.	7.3	48
86	Stepwise Direct Conversion of Methane to Methanol Over Cu-Mordenite Prepared by Supercritical and Aqueous Ion Exchange Routes and Quantification of Active Cu Species by H2-Tpr. SSRN Electronic Journal, 0, , .	0.4	0
87	Sub-nanometer Copper Clusters as Alternative Catalysts for the Selective Oxidation of Methane to Methanol with Molecular O₂. Journal of Physical Chemistry A, 2022, 126, 4941-4951.	1.1	6
88	Platinumâ€Catalysed Selective Aerobic Oxidation of Methane to Formaldehyde in the Presence of Liquid Water. Angewandte Chemie, 2022, 134, .	1.6	1
89	First-Generation Organic Reaction Intermediates in Zeolite Chemistry and Catalysis. Chemical Reviews, 2022, 122, 14275-14345.	23.0	43
90	Boosting room-temperature conversion of methane via confining Cu atoms in ultrathin Ru nanosheets. Chem Catalysis, 2022, 2, 2253-2261.	2.9	14
91	Platinumâ€Catalysed Selective Aerobic Oxidation of Methane to Formaldehyde in the Presence of Liquid Water. Angewandte Chemie - International Edition, 2022, 61, .	7.2	10

#	Article	IF	Citations
92	Oxidation of methane and ethylene over Al incorporated N-doped graphene: A comparative mechanistic DFT study. Journal of Molecular Graphics and Modelling, 2022, 117, 108284.	1.3	1
93	H2O in situ induced active site structure dynamics for efficient methane direct oxidation to methanol over Fe-BEA zeolite. Journal of Catalysis, 2022, 414, 302-312.	3.1	6
94	Photocatalytic conversion of methane selectively into oxygenated products in the presence of chloride ions. Chemical Engineering Journal, 2023, 452, 139505.	6.6	13
95	Metal Sites in Zeolites: Synthesis, Characterization, and Catalysis. Chemical Reviews, 2023, 123, 6039-6106.	23.0	95
96	Direct photocatalytic conversion of methane to value-added chemicals. Trends in Chemistry, 2022, 4, 1094-1105.	4.4	14
97	Edge-confined under-coordinated Cu atoms on Ru nanosheets enable efficient CH4 activation. Chem Catalysis, 2022, 2, 2118-2120.	2.9	2
98	High-Throughput Experimentation for Resource-Efficient Discovery of Methane Functionalization Catalysts. ACS Symposium Series, 0, , 123-145.	0.5	0
99	Structure of Selective and Nonselective Dicopper (II) Sites in CuMFI for Methane Oxidation to Methanol. ACS Catalysis, 2022, 12, 15626-15637.	5.5	13
100	Atomically Dispersed Nickel Anchored on a Nitrogenâ€Doped Carbon/TiO ₂ Composite for Efficient and Selective Photocatalytic CH ₄ Oxidation to Oxygenates. Angewandte Chemie, 0, , .	1.6	1
101	Methane Oxidation to Methanol. Chemical Reviews, 2023, 123, 6359-6411.	23.0	50
102	Copper-zeolites Prepared by Solid-state Ion Exchange - Characterization and Evaluation for the Direct Conversion of Methane to Methanol. Topics in Catalysis, 2023, 66, 1406-1417.	1.3	3
103	Atomically Dispersed Nickel Anchored on a Nitrogenâ€Doped Carbon/TiO₂Composite for Efficient and Selective Photocatalytic CH₄Oxidation to Oxygenates. Angewandte Chemie - International Edition, 2023, 62, .	7.2	18
105	Electrocatalytic methane conversion to high value chemicals at ambient conditions. Energy Conversion and Management, 2023, 285, 117029.	4.4	6
106	Spotlighting of the role of catalysis for biomass conversion to green fuels towards a sustainable environment: Latest innovation avenues, insights, challenges, and future perspectives. Chemosphere, 2023, 318, 137954.	4.2	9
107	Metalâ€"organic frameworks as catalysts and biocatalysts for methane oxidation: The current state of the art. Coordination Chemistry Reviews, 2023, 481, 215042.	9.5	19
108	Evolution of Active Oxygen Species Originating from O₂ Cleavage over Fe-FER for Application in Methane Oxidation. ACS Catalysis, 2023, 13, 3345-3355.	5.5	5
109	Ru single-atom catalyst anchored on sulfated zirconia for direct methane conversion to methanol. Chinese Journal of Catalysis, 2023, 46, 64-71.	6.9	3
110	Heterogeneous Mn-Based Catalysts for the Aerobic Conversion of Methane-to-Methyl Trifluoroacetate. ACS Catalysis, 2023, 13, 3896-3901.	5.5	3

#	Article	IF	Citations
111	Direct Catalytic Oxidation of Low-Concentration Methane to Methanol in One Step on Ni-Promoted BiOCl Catalysts. ACS Omega, 2023, 8, 11220-11232.	1.6	2
112	Continuous partial oxidation of methane to methanol over Cu-SSZ-39 catalysts. Journal of Catalysis, 2023, 421, 300-308.	3.1	6
113	Methane Oxidation over the Zeolites-Based Catalysts. Catalysts, 2023, 13, 604.	1.6	7
114	Atomic Insights into the Cu Species Supported on Zeolite for Direct Oxidation of Methane to Methanol via Lowâ€Damage HAADFâ€STEM. Advanced Materials, 2023, 35, .	11.1	29
116	Zeolite-based catalysts for oxidative upgrading of methane: design and control of active sites. Catalysis Science and Technology, 0, , .	2.1	1
124	Theoretical Perspective of Promoting Direct Methane-to-Methanol Conversion at Complex Metal Oxideâ€"Metal Interfaces. Journal of Physical Chemistry Letters, 2023, 14, 6556-6563.	2.1	2