



Second International Symposium

Advanced micro- and mesoporous materials'2007

September 6-9, 2007, Varna, Bulgaria

Program

September 6th

- 17:00 20:00 Registration, Hotel Chernomorec
- 20:00 22:00 Welcome reception, Panorama restaurant, Hotel Chernomorec

September 7th

- 9:00 P11 V. Kanazirev, USA
Industrial applications of micro- and mesoporous materials in adsorption technology
- 9:40 O1 J. C. Groen, J. Pérez-Ramírez, the Netherlands
Superior Alkylation Activity of Alkaline-assisted Mesoporous Mordenite
- 10:00 O2 V. Pashkova, M. Derewinski, Poland
Preparation of new acid type catalysts containing nanoclusters of zeolites (FAU, BEA) dispersed in amorphous porous matrix
- 10:20 O3 T. M. Nenoff, N. W. Ockwig, J. D. Pless, J. Clawson, T. M. Alam, M. Hartl, H. Xu, L. L. Daemen, USA
The role of occluded water in ion exchange selectivity of molecular sieves
- 10:40 Coffee break
- 11:10 PI2 G. Busca, Italy
Infrared studies on the localization of acid sites on microporous materials
- 11:50 O4 L. Rouleau, S. Morin, France
Nanocomposite porous materials
- 12:10 O5 A. Bourgeois, C. Defranoux, J. P. Piel, Y. Turcant, V. Couraudon, C. Walsh, France
Ellipsometric Porosimetry: Fast and non destructive method of porosity characterization of porous thin films

- 12:30 O6 L. Juhasz, A. Vass-Varnai, C. Dominkovics, V. Timar-Horvath, Hungary
Porous Al₂O₃ layers for capacitive RH sensors
- Lunch break
- 16:30 O7 M. Ohtaki, R. Hayashi, Japan
Structure and magnetic properties of iron oxide self-assembly superlattice synthesized by hydrothermal treatment of surfactant-directed lamellar mesophase
- 16:50 O8 E. Stavitski, M. H.F. Kox, B. M. Weckhuysen, The Netherlands
Non-uniform catalytic behavior of zeolite crystals as revealed by in-situ optical micro-spectroscopy
- 17:10 O9 B. Camarota, S. Mann, B. Onida, E. Garrone, Italy & UK
Hierarchical self-assembling in molecularly ordered phenylene-bridged mesoporous organosilica
- 17:30 Short oral presentations
- SO1-1 Y. Oztekin, I. E. Mulazimoglu, Z. Yazicigil, A. O. Solak, Turkey
Mechanistic Studies of Quercetin and Naringenin Modification at the Glassy Carbon Electrode
- SO1-2 S. Ferdov, Z. Lin, R. A. Sá Ferreira, Portugal
From microporous to macroporous via germanium oxide
- SO1-3 S. Habib, F. Launay, Y. Millot, J.-L. Paillaud, S. Laforge, P. Magnoux, A. Gédéon, France
Synthesis and Characterization of Micro/Mesoporous Molecular Sieves prepared from ZSM-5 zeolite
- SO1-4 V. I. Isaeva, O. P. Tkachenko, A. A. Kostin, L. M. Kustov, Russia
Preparation and Characterization of Carboxylate Metal Organic Framework
- SO1-5 T. Verstraelen, P.W. Ayers, D. Van Neck, V. Van Speybroeck, M. Waroquier, Belgium
New force-field models for biporous zeolites with guest molecules
- SO1-6 P. Vansteenkiste, T. Verstraelen, V. van Speybroeck, M. Waroquier, Belgium
Nanoslab formation from MFI precursors with interacting TPAOH
- SO1-7 S. Kowalak, A. Jankowska, E. Mikołajska, Poland
Synthesis of ultramarine analogs from losod and other non-sodalite structures
- SO1-8 L.A. Correia, B. Bonekamp, E. Schuring, M. Bregman, Y.C. van Delft, the Netherlands
Mechanical testing of adherence of stacked layers in tubular geometry

- SO1-9 S. Goergen, E. Guillon, J. Patarin, L. Rouleau, France
Synthesis of Hierarchical Structured Zeolite EU-1 (EUO) Monoliths by Dry Gel Conversion
- SO1-10 Yu. I. Aristov, L.G. Gordeeva, Russia
Nanocomposite Sorbents: Salt inside Porous Matrix: Desing of Phase Composition and Sorption Properties, Practical Applications
- SO1-11 O. Dimitry, A. Saad, Egypt
Studies on some Poly (vinyl chloride)/layered Silicate Nanocomposites
- SO1-12 D. I. Petukhov, I. V. Kolesnik, A. A. Eliseev, A. V. Lukashin, Yu. D. Tretyakov, Russia
Synthesis and SANS Study of Porous Anodic TiO₂ Films
- 18:45 Poster session 1
- 20:00 End of the poster session

September 8th

- 9:00 PI3 M. Iwamoto, Japan
Metathesis of olefins on nickel ion-loaded mesoporous silica
- 9:40 O10 D. Akcakayiran, D. Mauder, I. Shenderovich, G. H. Findenegg, Germany
SBA-15 silica doped with different acid groups: characterization and potential application
- 10:00 O11 S. Walspurger, J. Sommer, B. Louis, France
Quantification of the Brönsted acid sites in solid acids: a new approach for the design of metallic single-sites
- 10:20 O12 L. F. Petrik, Z. G. Godongwana, P. Ndungu, V. M. Linkov, S. Liao, South Africa
LPG synthesis of carbon analogue of HMS
- 10:40 Coffee break
- 11:10 PI4 M. Stoecker, Norway
Biofuels/biomass-to-liquids (BTL) within the biorefinery concept: the catalytic conversion of biomass using porous materials
- 11:50 K1 J. A. van Bokhoven, Switzerland
Structure and activity of crystalline and amorphous microporous and mesoporous alumina-silicates
- 12:20 O13 S. Zanardi, A. Carati, C. Rizzo, R. Millini, M. C. Dalconi, Italy
Structural characterization of the hydrated and dehydrated forms of ion-exchanged stannosilicate EMS-2

		Lunch break
14:00		Excursion
18:00		Short oral presentations
SO2-1	<u>M. Mihaylov</u> , E. Ivanova, H. A. Aleksandrov, M. Daturi, F. Thibault-Starzyk, G. N. Vayssilov, N. Rösch, K. Hadjiivanov, Bulgaria, France, Germany	<i>Unusual Carbonyl-Nitrosyl Complexes of Rh²⁺ in Rh-ZSM-5: A Combined FTIR Spectroscopy and Computational Study</i>
SO2-2	J. Marcel R. Gallo, <u>C. Bisio</u> , H. O. Pastore, L. Marchese, Italy	<i>Surface acid properties of [Al]-SBA-15 materials prepared by direct synthesis</i>
SO2-3	<u>H. Iglev</u> , M. Schmeisser, A. Laubereau, Germany	<i>Ultrafast temperature and pressure changes in H-bonded systems</i>
SO2-4	<u>S. Ts. Khankhasaeva</u> , M. N. Timofeeva, S. V. Badmaeva, E. Ts. Dashinamzhilova, Russia	<i>The influence of cation intercalating into clay on physicochemical and catalytic properties in full phenol oxidation</i>
SO2-5	<u>V. Idakiev</u> , T. Tabakova, Z.-Y. Yuan, A. Vantomme, B.-L. Su, Bulgaria, Belgium, China	<i>Gold nanoparticles supported on ceria-modified hierarchically mesoporous-macroporous binary metal oxides as highly active catalysts for low-temperature water-gas shift reaction</i>
SO2-6	<u>V. Cauda</u> , R. Mortera, S. Fiorilli, B. Onida, E. Vernè, C. Vitale Brovarone, G. Croce, M. Milanese, D. Viterbo, E. Garrone, Italy	<i>Ordered mesoporous silicas inside bioactive scaffolds for local drug release</i>
SO2-7	<u>R. Bakalova</u> , Z. Zhelev, G. Zlateva, I. Aoki, H. Ohba, I. Kanno, Japan, Bulgaria	<i>Quantum Dot-based Nanobioprobes for Multimodal Imaging and Biomedical Diagnostics</i>
18:40		Poster session 2
20:30		Social Dinner

September 9th

9:00	PI5	R. A. van Santen, the Netherlands	<i>Modeling of zeolite catalysis</i>
9:40	O14	<u>R. Bulánek</u> , C. Otero-Areán, D. Nachtigallová, K. Frolich, P. Nachtigall, Czech Republic & Spain	<i>Similarities and Differences in IR Spectra of CO Adsorbed in Alkali-Metal-Exchanged Zeolites</i>
10:00	O15	<u>S. R. Stoyanov</u> , S. Gusarov, A. Kovalenko, Canada	<i>Density Functional Theory Modeling of Zeolite Nanoparticles</i>

- 10:20 O16 J. Dědeček, S. Sklenak, C. Li, V. Gábová, M. Sierka, J. Sauer, Czech Republic & Germany
The Sitting, Geometry and ²⁷Al Chemical Shift of Aluminum Atoms in the Framework of ZSM-5
- 10:40 Coffee break
- 11:10 K2 H. Knözinger, Germany
Infrared characterization of Au/NaY catalysts
- 11:40 O17 V. Gurin, I. Tuzovskaya, N. Bogdanchikova, A. Pestryakov, M. Avalos, M. H. Farías, Belarus, México & Russia
Stabilization of gold in zeolites with various structural and ionic properties
- 12:00 O18 A. Zürner, J. Kirstein, C. Jung, C. Bräuchle, T. Bein, Germany
Exploring Nanostructured Channel Systems with Single Molecule Probes
- 12:20 O19 F. Juranyi, M. Christensen, R. Hermann, F. Grandjean, B. B. Iversen, G. J. Long, O. Isnard, Switzerland, Denmark, Germany, Belgium, USA & France
Dynamics of semiconducting clathrates measured by neutron scattering
- 12:40 O20 A. G. Patis, V. Dracopoulos, V. Nikolakis, Greece
Investigation of silicalite-1 crystallization using ATR/FTIR spectroscopy
- Lunch break
- 16:30 O21 D. Grande, France
Nanoscale porous polymer structures with tunable pore size
- 16:50 O22 Sn. Bakardjieva, V. Stengl, J. Subrt, R. Petrova, V. Kostov-Kytin, Czech Republic, Bulgaria & Japan
Micro- and meso-porous TiO₂-synthesis and photocatalytic application
- 17:10 O23 M. Hureau, A. Moissette, C. Brémar, H. Vezin, France
Long lived correlated charge separated state induced by spontaneous ionization of t-stilbene occluded in medium size zeolites. Influence of the pore opening size on the charge stabilization
- 17:30 O24 V. Sebastian, I. Diaz, C. Tellez, J. Santamaria, J. Coronas, Spain
Spheres of the microporous titanosilicate umbite with hierarchical pore systems prepared by hydrothermal synthesis without the use of organic structuring agents
- 17:50 O25 E.-P. Ng, S. Mintova, France
Nanoporous materials as high selective water sorbents
- 18:10 O26 J. Kecht, S. Mintova, T. Bein, Germany & France
Exceptionally small metal-amine templated zeolite nanocrystals
- 18:30 Closing of the symposium

Poster Session 1

Short oral presentations

- SO1-1 Y. Oztekin, I. E. Mulazimoglu, Z. Yazicigil, A. O. Solak
“Mechanistic Studies of Quercetin and Naringenin Modification at the Glassy Carbon Electrode”
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- SO1-12 D. I. Petukhov, I. V. Kolesnik, A. A. Eliseev, A. V. Lukashin, Yu. D. Tretyakov
“Synthesis and SANS Study of Porous Anodic TiO₂ Films”

Poster presentations

- P1-1 I. V. Kolesnik, D. I. Petukhov, A. A. Eliseev, A. V. Lukashin, Yu. D. Tretyakov
“Synthesis of CdSe/Mesoporous SiO₂ Composites with Narrow Particle Size Distribution”
- P1-2 A. Macario, P. Frontera, G. Giordano, A. Aloise, C. Sposato, E. Janiszewska, S. Kowalak
“Hydrothermal synthesis and characterization of metal-benzenetricarboxylate adsorbents”
- P1-3 S. Kowalak, E. Janiszewska, L. Michalska
“Attempts to prepare the mesoporous hydroxyapatite”
- P1-4 B. Gorzolinik, J. Penelle, and D. Grande
“Mesoporous Materials with Controlled Porosity and Functionality Derived from Nanostructured Diblock Copolymers”
- P1-5 D. Grande, N. Lacoudre, C. Lorthioir, K. Gusakova, O. Grigoryeva, A. Fainleib
“Porous cyanurate networks: design, synthesis, and characterization”
- P1-6 N. Agoudjil, T. Benkacem
“Sol-Gel Synthesis of Titania Membrane and Characterisation”
- P1-7 B. Jarry, F. Launay, J. L. Bonardet
“Syntheses of new Ga-SBA15 mesostructured silicas: catalytic performances in a-pinene isomerisation and comparison with Al-SBA15 analogues”
- P1-8 M. Hureau, A. Moissette, S. Marquis, C. Brémard
“Influence of the aluminum content and pore opening size on anthracene spontaneous ionization in zeolites”
- P1-9 M. Kostova, D. Ananias, F. A. Paz, J. Rocha, L. D. Carlos
“Synthesis and characterization of photoluminescent microporous lanthanide silicates”
- P1-10 B. Cekova, D. Kocev, E. Kolcakovska
“Obtaining Co²⁺ form using ionic exchange of zeolite 4A with water solution of Co(NO₃)₂”
- P1-11 A. Aloise, A. Macario, L. Forni, G. Fornasari, G. Giordano, J. B. Nagy, F. Trifirò
“Pure Silica BEA: Synthesis, Characterization and Catalytic Application to Vapour Phase Oximes Transposition”
- P1-12 P. Hrabánek, A. Zikánová, B. Bernauer, V. Fíla, M. Kočířik
“Preparation and characterization of zeolite MFI layers on α-alumina supports”

- P1-13 Y. Mathieu, B. Lebeau, V. Valtchev
 “Preparation and properties of γ -Al₂O₃ films prepared by high temperature transformation of nanosized γ -AlOOH precursors”
- P1-14 R. Petrova, K. Fujiwara, N. Nakayama, V. Kostov-Kytin
 “Structural studies and thermal behavior of layered zirconosilicate Na₂Zr₇Si_{2.5}O₂₀·3H₂O and its ion exchanged forms”
- P1-15 N. Petrova, R. Petrova, Ts. Stanimirova, R. Titorenkova, S. Bakardjieva
 “Synthesis and characterization of Mg - Al - squarate layered double hydroxides”
- P1-16 S. G. Wakchaure, A. V. Borhade, J. M. Gandhgole
 “Hydrothermal Synthesis and Characterization of Perchlorate Enclatherated Sodalite Na₈[GaSiO₄]₆(ClO₄)₂”
- P1-17 J. Jiménez-Jiménez, R. Moreno-Tost, E. Rodríguez-Castellón, A. Jiménez-López
 “Hybrid zirconium phosphate heterostructures: Synthesis and applications”
- P1-18 I. Chepurna, V. Kanibolotskyy, S. Pakhovchyshyn, V. Strelko
 “Nanosized hydrated zirconium dioxide: preparation and properties”
- P1-19 S. Meleshevych, V. Kalenchuk, V. Kanibolotskyy, M. Tsyba, V. Strelko
 “The influence of synthesis conditions on the structural and sorptive properties of titanosilicates”
- P1-20 M. L. Gonçalves, L. D. Dimitrov, M. Wallau, E. A. Urquieta-González
 “Synthesis of mesoporous zeolite ZSM-5 by controlled ageing and crystallization in the presence of cetyltrimethylammonium bromide”
- P1-21 H. Šiklová, A. Zuka, N. Žilková, J. Čejka
 “Preparation of MCM-41 Silica Using the Cationic Surfactant Blend”
- P1-22 S. S. Park and C.-S. Ha
 “Free-Standing and Oriented PMO Films with Variable Pore Size at the Air-Water Interface”
- P1-23 S.V. Badmaeva, E. Ts. Dashinamzhilova, S. Ts. Khankhasaeva
 “Textural and adsorptive properties of Al-pillared clays”
- P1-24 H.-S. Yun, S.-E. Kim, Y.-T. Hyun
 “Preparations of Bioactive Glass Ceramics with Various Hierarchical 3D Pore Networks”
- P1-25 H.-S. Yun, S.-E. Kim, Y.-T. Hyun
 “Synthesis and Characterization of Mesoporous Bioactive Glasses with Highly Ordered Meso-pore Structure”

- P1-26 F. Oksuzomer, S. N. Koc, S. Vatansever, M. A. Gurkaynak
“Preparation of nanocrystalline %3 Ce Doped YSZ powders”
- P1-27 D. P. Serrano, G. Calleja, R. Sanz, P. Pizarro
“Effect of Si-doping on thermal stability and textural properties of mesostructured TiO₂ synthesized by a soft-templated route”
- P1-28 R. Sanz, G. Calleja, A. Arencibia, E. Sanz
“Useful tool to determine the distribution of organic functional groups in hybrid mesostructured materials by TEM”
- P1-29 I. Tiscornia, S. Irusta, C. L. de Ménorval, C. Téllez, J. Santamaría, J. Coronas
“Preparation and characterization of titanosilicate Ag-ETS-10”
- P1-30 P. Topka, L. Matejova, O. Solcova
“Tailoring of nanoporous Titania by sol-gel method for subsequent modification”
- P1-31 L. Matejova, P. Kluson, Z. Matej, J. Pavlik, O. Solcova
“Thorough characterization of sol-gel prepared thin TiO₂ films”
- P1-32 I. E. Mulazimoglu, Y. Oztekin, Z. Yazicigil, A. O. Solak
“Preparation and Characterization of Polyphenol Films at the Glassy Carbon Surfaces”
- P1-33 J. M. R. Gallo, C. Bisio, L. Marchese, H. O. Pastore
“Direct synthesis and characterization of [Al]-SBA-16”
- P1-34 Y. Goto, T. Ogiwara, T. Matsumoto, M. Yoshida
“Zeolitization of porous body fabricated from coal fly ash and natural zeolite”
- P1-35 P. Horcajada, C. Serre, M. Valet-Regi, M. Seban, F. Taulelle, G. Férey
“Metal-Organic-Frameworks for Drug Controlled Delivery”
- P1-36 R. Birjega, L. Nistor, R. Ganea, A. Rotaru, G. Van Tendeloo, T. Blasco, F. Rey
“Morphological and microstructure features in organized mesoporous aluminas”
- P1-37 Z. Sarbak, D. Markiewicz, K. Wieczorek
“Textural and adsorptional properties of chemical modifications of diatomites”
- P1-38 A. Darwiche, J. de Lamare, M. Comte, V. Valtchev
“Kinetics of Silicalite-1 Film Growth on α -Al₂O₃ Membrane Supports”
- P1-39 A. Borówka, J. Goworek
“Meso- and microporosity of MCM-41 silicas”
- P1-40 F. Dumitru, A. Razvan, M. Şerb, A. Ficai, C. Guran
“Mesoporous molecular sieves (MCM-41) functionalized with crown ethers for ion pair

extraction”

- P1-41 S. M. Hashemianzadeh, B. Sohrabi, B. Tajik
“Studying the effect of Poly Ethylen Glycohol(PEG) on the nanostructure formation in ionic surfactants solution”
- P1-42 I.-H. Song, Y.-J. Kim, H.-D. Kim, D.-P. Kim
“Colloidal Crystal Templating of Two Dimensionally Ordered Macroporous SiCN Ceramics”
- P1-43 J. Kobler, T. Bein
“Transparent Sols of Mesoporous Silica Nanoparticles for the Preparation of Thin Films for Chemical Sensors”
- P1-44 A. A. Lemus-Santana, L. F. del Castillo, J. Balmaseda, M. J. Basterrechea-Rey, E. Reguera
“Characterization of 4,4'-bipyridine-pillared compound $[\text{Ni}(\text{II})(\text{bipy})\text{Ni}(\text{CN})_4] \cdot 7\text{H}_2\text{O} \cdot 2(\text{bipy})$ using N_2 sorption”
- P1-45 A. Mihaylova, K. Hadjiivanov, P. Stefanov, S. Dzwigaj, M. Che
“Cobalt Ions in Siliceous BEA Zeolite”
- P1-46 V. Tsoukala, V. Nikolakis, S. N. Yannopoulos
“Encapsulation of selenium in silicalite-1 crystals”
- P1-47 J. C. Alonso, Ts. Petkova, P. Ferreira
“Mesoporous benzene-silica hybrids with phosphine oxide ligands”
- P1-48 C. Scherb, E. Biemmi, T. Bein
“Growth of metal organic framework thin films on gold substrates functionalized with self-assembled monolayers”
- P1-49 J. Schuster, A. Keilbach, R. Köhn, T. Bein
“Highly Ordered Mesoporous Thin Films Made of Phenolic Resin by an Organic-Organic EISA Process”
- P1-50 R. Köhn, A. Keilbach, A. Zürner, B. Platschek, M. Döblinger, T. Bein
“*In situ* GISAXS Study of the Formation and Phase Transformation of Mesostructures within the Confined Space of Anodic Alumina Membrane Pores”
- P1-51 D. D. Radev, T. Spassov
“Creation of TiNi Bio Alloys with Controlled Porosity using Mechanical Alloying and Activated Sintering Process”
- P1-52 Yu. Kalvachev, V. Ganev, L. Macheva, J. Harizanova
“User requirements for remote accessed instruments in material science”

Poster Session 2

Short oral presentations

- SO2-1 M. Mihaylov, E. Ivanova, H. A. Aleksandrov, M. Daturi, F. Thibault-Starzyk, G. Vayssilov, N. Rösch, K. Hadjiivanov
“Unusual Carbonyl-Nitrosyl Complexes of Rh²⁺ in Rh-ZSM-5:A Combined FTIR Spectroscopy and Computational Study”
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“Ordered mesoporous silicas inside bioactive scaffolds for local drug release”
- SO2-7 R. Bakalova, Z. Zhelev, G. Zlateva, I. Aoki, H. Ohba, I. Kanno
“Quantum Dot-based Nanobioprobes for Multimodal Imaging and Biomedical Diagnostics”

Poster presentations

- P2-1 A. Itadani, M. Tanaka, Y. Kuroda, M. Nagao
“Interaction of copper-ion-exchanged MFI zeolite with an acetylene molecule at room temperature”
- P2-2 D. Nibou, S. Amokrane, S. Lebaili
“Catalytic Behaviour of AlPO-11, SnAPO-11, SAPO-31 and SAPO-41 in Ammonia Alkylation with Octanol-1 in Gaseous Phase”
- P2-3 S. Amokrane, D. Nibou, S. Lebaili

“Kinetic of Toluene Disproportionation Reaction over ZSM-5 Catalyst”

P2-4 Z. Pavlačková, A. Zukal, N. Žilková, J. Čejka

“Alkylation of p-Xylene with Isopropyl Alcohol over Mesoporous ZSM-5”

P2-5 E. Garcia, P. Rodriguez, A. Uzcategui, F. E. Imbert

“Meta-xylene Isomerization over Tungstophosphoric Acid Supported on MCM-48”

P2-6 C. Lesaint, D. Arla, W. Glomm, G. Øye

“Synthesis, functionalization and characterisation of mesoporous alumina materials for Fisher-Tropsch catalysis”

P2-7 K. Bachari, A. Saadi, D. Halliche, O. Cherifi

“Study of the benzylation of aromatics on Nickel-containing mesoporous materials”

P2-8 G. S. Mishra, E. C. B. Alegria, L. R. Martins, A. J. L. Pombeiro

“Functionalization of n-alkane with dioxygen catalyzed by 3-aminopropyl functionalized Silica supported rhenium complexes”

P2-9 Z. Abdessadek, F. Touahra, K. Bachari, A. Saadi, O. Cherifi, D. Halliche

“Synthesis, characterization and application of Ni/Mg/Al(La) hydrotalcites in methane dry reforming”

P2-10 C. Sener, K. Arishtirova, R. N. Nikolov, T. Dogu, G. Dogu, S. Damyanova

“Dry Reforming of Methane over Ni/MCM-41 Catalysts”

P2-11 D. Procházková, M. Bejblová, J. Čejka

“Acylation of Cyclohexene over Zeolites”

P2-12 N. G. Kostova, A. A. Spojakina, R. Dimitrova, V. Mavrodinova, Y. Neinska

“Synthesis and characterization of NiMo/Al-MCM-41 hydrodesulfurization catalyst”

P2-13 R. M. Mihályi, I. Kolev, V. Mavrodinova, M. Kollár, T. Korányi, Ch. Minchev

“Effect of the partial substitution of Al by B in MCM-22 zeolite on the selectivity and catalytic activity in toluene disproportionation”

P2-14 P. Cicmanec, L. Capek, P. Knotek, M. Setnicka

“Supported VMoO_x-hexagonal mesoporous silica catalysts for the partial oxidation of alkanes”

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