

AIZ-CIS-GIC Jointly Meeting 2019, 11th - 14th June, 2019



BOOK OF FULL ABSTRACTS

Jointly Meeting of the
Italian Zeolite Association (AIZ)
Czech-Italian-Spanish (CIS) Conference
Italian Interdivisional Catalysis Group (GIC)





XVI National Congress of Zeolites Science and Technology



8th Czech-Italian Spanish Conference on Molecular Sieves and Catalysis



XXI National Congress of Catalysis

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PROGRAM

TUESDAY, 11 TH JUNE	
14:30-16:00	Registration
16:00-16:30	Opening
16:30-17:15	PL1 - Giuseppe Bellussi: The energy transition towards a zero emission energy supply system (Chair: Girolamo Giordano)
17:15-18:15	Session Tu-1
17:15-17:35	O1 - PÉREZ-BOTELLA: Influence of zeolite framework topology in the CO ₂ /CH ₄ separation
17:35-17:55	O2 - GARBARINO: On the role of La ₂ O ₃ and SiO ₂ in the formulation of Ni/Al ₂ O ₃ based CO ₂ methanation catalysts
17:55-18:15	O3 - NACHTIGALL: Fast room temperature lability of aluminosilicate zeolites
18:15-18:55	Award's talks (Chairs: Giuseppe Cruciani and Fabrizio Cavani)
18:15-18:35	Premio Gottardi 2019 - CAMPANILE: Facile synthesis of nanostructured cobalt pigments by Co-A zeolite thermal conversion and its application in porcelain manufacture
18:35-18:55	Premio Parmaliana 2019 - FIORENZA: Modified TiO ₂ -based catalysts for energy production and environmental protection
18:55-19:30	IL1 - Carlo Perego: Giuseppe Bellussi and zeolite science: a long history of success
20:00	Welcome Party
WEDNESDAY, 12 TH JUNE	
8:30-9:15	PL2 - Jiří Čejka: Adorable zeolites and catalysts (Chair: David Serrano)
9:20-10:40	Session We-1a (Chair: Domenico Caputo)
09:20-9:40	O4 - PAPANIKOLAOU: Effect of a mild NH ₄ OH treatment on local structure and acidic sites distribution of Fe-MFI
9:40-10:00	O5 - MARTÍNEZ ORTIGOSA: Silicalite synthesized by the dual-template technique: a solid state NMR study
10:00-10:20	O6 - ZANARDI: Crystalline hybrid organic-inorganic gallosilicates: synthesis and crystal structure
10:20-10:30	SO1 - PATEROVA: Use of Lewis and Brønsted acids as catalysts for β-pinene oxide rearrangement to prepare myrtenol and myrtanal
10:30-10:40	SO2 - SAJAD: Catalytic activity of noble metal clusters encapsulated in zeolites
10:40-11:00	Coffee Break
11:00-13:00	Session We-2a (Chair: Giovanna Vezzalini)
11:00-11:20	O10 - ALONSO-DONCEL: Tuning mesoporosity in hierarchical ZSM-5 zeolite by changing the silanization agent functionality
11:20-11:40	O11 - FABBIANI: Polymerization of hexadiene and phenylacetylene confined in silica zeolite channels
11:40-12:00	O12 - CAMETTI: Structural modifications and thermal stability of Cd ²⁺ -exchanged stellerite, a zeolite with STI framework type
12:00-12:20	O13 - COMBONI: High-pressure cold methanol intrusion in MFI-zeolites
12:20-12:40	O14 - KUBŮ: Encapsulation of metal nanoparticles (NPs) within zeolite frameworks via 2D to 3D transformation
12:40-12:50	SO5 - ERIGONI: Synthesis and characterization of organosiliceous hybrid materials containing acid functionalities
12:50-13:00	SO6 - LEO: Direct α-arylation of ketones efficiently catalyzed by Cu-MOF-74
13:00-14:00	Lunch
14:00-15:30	Free Time
15:30-17:10	Session We-3 (Chair: Joaquin Pérez Pariente)
15:30-15:40	SO9 - YUE: Multiple phase transformations during the synthesis of germanosilicate UOS
15:40-15:50	SO10 - BELVISO: Synthetic zeolite and laser effect: preliminary data
15:50-16:00	SO11 - ARDIT: The ferroelastic phase transition in ZSM-5 zeolites: chemistry vs. thermodynamic
16:00-16:20	O20 - BONURA: The key role of metal-zeolite interaction for stability of hybrid catalysts during CO ₂ -to-DME hydrogenation
16:20-16:30	SO12 - PŘECH: Silica metal-oxide pillared zeolites – green selective oxidation catalysts
16:30-16:50	O21 - VILLAMAINA: Cu-CHA catalysts for NH ₃ -SCR: the roles of SiO ₂ /Al ₂ O ₃ and Cu loading in the Cu-speciation
16:50-17:10	O22 - CAMPISI: Selective catalytic oxidation of ammonia (NH ₃ -SCO) on iron beta zeolite catalysts prepared by ion exchange and solvated metal atom dispersion
17:10-19:00	Poster Session + Refreshments
19:00-20:00	General Assembly AIZ
19:00-20:00	General Assembly GIC
20:30	Dinner

THURSDAY, 13TH JUNE

8:30-9:15	PL3 - Avelino Corma: Inspiration from research and technology by ENI and G. Bellussi (Chair: Maksym Opanasenko)
9:20-10:40	Session Th-1
9:20-9:40	O23 - VESELÝ: Zeolites in Pechmann condensation: Impact of framework topology and type of acid site
9:40-10:00	O24 - CASTOLDI: Metal-doped zeolites for low-T NO _x adsorption: operando FT-IR spectroscopy and reactivity studies
10:00-10:10	SO13 - GÓMEZ-POZUELO: Catalytic biomass pyrolysis over KH-ZSM-5 zeolite with acid-base properties
10:10-10:20	SO14 - CHENET: Adsorption of p-hydroxybenzaldehyde onto zeolites for water remediation: evaluation of the competition between contaminant and natural organic substances
10:20-10:30	SO15 - PALOMINO-CABELLO: Sulfonamides photodegradation assisted by $\alpha\text{Fe}_2\text{O}_3\text{-TiO}_2\text{-P}/\text{K}_2\text{S}_2\text{O}_8$ system
10:30-10:40	SO16 - CONFALONIERI: Dehydration of an azeotrope solution at high pressure through a differential penetration of ethanol and water in Si-chabazite
10:40-11:00	Coffee Break
11:00-11:30	IL2 - Adriano Zecchina: Contribution of spectroscopies to zeolites and microporous materials science (Chair: Silvia Bordiga)
11:30-13:05	Microsymposium Carlo Lamberti (Chair: Gloria Berlier)
11:30-11:50	KN1 - BORFECCHIA: Understanding selective redox chemistry in Cu-zeolites: a synchrotron-enhanced multi-technique perspective
11:50-12:10	O25 - VAN BOKHOVEN: In situ characterization of zeolitic catalysts
12:10-12:30	O26 - BUSCA: Cobalt metal catalysts in the hydrogen chemistry: support and preparation effects in CO ₂ methanation and ethanol steam reforming
12:30-12:40	SO17 - GIGLI: New insights on the crystal structure of ZSM-12 with azonia spiro salts
12:40-12:50	SO18 - CROCELLÀ: Advanced spectroscopic characterization of acidic sites in hierarchically structured zeolites as catalysts for hindered substrates
12:50-13:00	SO19 - BELTRAMI: Neutron and <i>in situ</i> synchrotron x-ray powder diffraction analysis to study the thermal activation of NH ₄ omega zeolite
13:00-14:00	Lunch
14:00-15:30	Free Time
15:35-16:50	Session Th-2 (Chair: Francesco Di Renzo)
15:30-15:40	SO20 - POLISI: First hints on pressure-induced amino acids condensation in mordenite
15:40-15:50	SO21 - BRUNDU: Thermal transformation of (NH ₄ , Ba)-clinoptilolite to monocelsian, mullite, and cristobalite
15:50-16:00	SO22 - MANCINELLI: One-step deposition method for the synthesis of a nanocomposite membrane based on reduced graphene oxide/zeolite-A for adsorption of metal ions with enhanced antibacterial properties
16:00-16:20	O27 - GÓMEZ-HORTIGÜELA: Conformational sieving effect of ephedrine derivatives during the synthesis of zeolite materials
16:20-16:40	O28 - PIRONE: Nitrous oxide decomposition over copper-containing ZSM-5: unravelling the isothermal oscillatory behavior
16:40-16:50	SO23 - ATZORI: Mesoporous NiO-CeO ₂ mixed oxides for CO and CO ₂ co-methanation
16:50-20:00	Social Event
20:30	Dinner

FRYDAY, 14TH JUNE

8:30-9:05	IL3 - Suheil Abdo: Key role of zeolitic technologies in meeting current and future societal needs (Chair: Petr Nachtigall)
09:10-10:50	Session Fr-1
9:10-9:20	SO24 - VYSKOČILOVÁ: Solid acid catalysts for the direct hydration of dihydromyrcene
9:20-9:30	SO25 - ESPOSITO: Study of the effect of preparation procedure on the formation of active and stable ceria-zirconia supported molybdenum oxide catalysts for cyclooctene epoxidation
9:30-9:50	O29 - BELTRAMI: Mesoporous ZSM-5 loaded with amino acids: does secondary mesoporosity affect sorption capacity and thermal regeneration?
9:50-10:10	O30 - MAZUR: A kinetics study into the hydrolysis and intercalation processes within the ADOR mechanism
10:10-10:30	O31 - DIAZ: Ti-SBA-15 with tailor made pore size and particle morphology for epoxidation of vernonia oil
10:30-10:40	SO26 - CUMPLIDO: Synthesis of Al-rich ZSM-12 zeolite using a dabco derivative as a structure-directing agent
10:40-10:50	SO27 - PAPANIKOLAOU: Ni zeo-type catalysts for algal oil upgrading: role of acidity and active-site accessibility
10:50-11:20	Coffee Break
11:20-12:50	Session Fr-2 (Chair: Siglinda Peratoner)
11:20-11:40	O32 - GUTIÉRREZ-RUBIO: Guaiacol hydrodeoxygenation over Ni ₂ P supported on 2D-zeolites
11:40-11:50	SO28 - BOCCIA: Alkali metals promoted Ru/Al ₂ O ₃ catalysts for CO ₂ methanation
11:50-12:10	O33 - PIZZOLITTO: Effect of grafting solvent in the optimisation of SBA-15 acidity for levulinic acid production
12:10-12:30	O34 - LEO: Different activity and stability of Fe-containing MOF materials for fenton oxidation processes
12:30-12:40	SO29 - LÓPEZ-HERNÁNDEZ: CO catalytic oxidation reaction as a tool to evaluate the nature of Ag-catalysts
12:40-13:00	Final remarks



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NEW INSIGHTS INTO THE MONOCLINIC - TO - ORTHORHOMBIC PHASE TRANSITION IN MFI-ZEOLITES

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The so-called ZSM-5 zeolites have a MFI-type structure, and are characterized by an Al-doped siliceous framework (Fig. 1), with the Si/Al ratio ranging from 10 to infinity; when this ratio exceeds 1000, the zeolite is typically known as “Silicalite-1”. The ZSM-5 zeolites exhibit a complex polymorphism, as they may crystallize either in the orthorhombic $P2_12_12_1$ space group, or in the more common orthorhombic $Pnma$ and even in the monoclinic $P2_1/n11$ space groups (usually referred to as ORTHO and MONO, respectively). A monoclinic ($P2_1/n11$)-to-orthorhombic ($Pnma$) phase transition (hereafter MOPT) has been reported in ZSM-5 zeolites,^{1,2} in response to different variables.

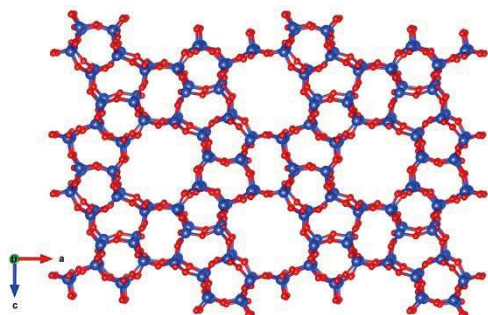


Figure 1. (left) The MFI- framework (oxygen atoms in red, silicon atoms in blue) viewed down [010].

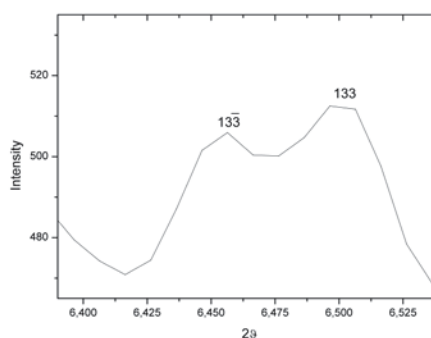
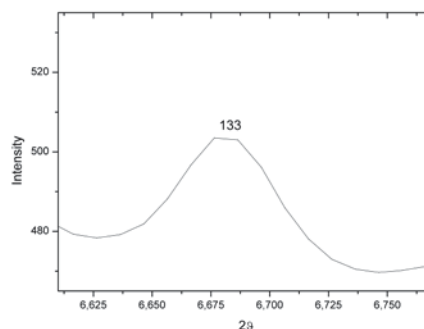


Figure 2. (right) Merging of the diagnostic reflection due to the MOPT at high pressure.





Several variables, such as temperature, pressure, framework chemistry, concentration of defects, as well as the nature and the concentration of the sorbate, may stabilize the *Pnma* or the *P2₁/n* polymorphs.³⁻⁶ In particular, the temperature and pressure at which the MOPT occurs largely depends on the framework composition. In order to obtain new insights into the mechanism of the MOPT at varying chemical and pressure conditions, we synthesized six chemically distinct MFI-zeolites, with framework-Si partially replaced by Al or B (counterbalanced by Na or H as extra-framework cations, see Tab. 1). Then, by *in situ* synchrotron X-ray powder diffraction experiments with a diamond-anvil cell, the high-pressure behavior of the synthesized MFI-zeolites has been studied using methanol and silicone oil as pressure-transmitting fluids. All the investigated zeolites crystallized in the monoclinic *P2₁/n11* space group and experienced the MOPT during compression. The Na-Silicalite-1 (Table 1), for example, underwent the monoclinic-to-orthorhombic phase transition at ~ 0.5 GPa in silicone oil and at ~ 0.4 GPa in methanol. A preliminary analysis suggests that, when compressed in the non-penetrating silicone oil, the doped MFI zeolites experience the MOPT at lower pressures than the Na-SiO₂ silicalite.

Table 1. Chemical composition of investigated materials.

<i>Sample</i>	<i>Chemical fomula</i>	<i>Sample</i>	<i>Chemical fomula</i>
Na-Al-MFI	Na _{2.51} Al _{0.81} Si _{95.19} O ₁₉₂	H-B-MFI	Na _{0.02} B _{1.20} Si _{94.80} O ₁₉₂
H-Al-MFI	Na _{0.05} Al _{0.87} Si _{95.13} O ₁₉₂	Na-Fe-MFI	Na _{1.31} Fe _{0.89} Si _{95.11} O ₁₉₂
Na-B-MFI	Na _{2.84} B _{1.35} Si _{94.65} O ₁₉₂	Na-Silicalite-1	Na _{3.37} Si ₉₆ O ₁₉₂

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