

Recent advances in EPR studies of porous materials

Matvey Fedin

International Tomography Center SB RAS, Novosibirsk, Russia

Materials with intrinsic nanoscale pores (often referred to as nano/meso/microporous materials) are of great interest in many fields of science, and they are actively employed and considered for many applications. The use of Electron Paramagnetic Resonance (EPR) spectroscopy in research of such compounds and materials can be very fruitful and bring new knowledge on the morphology of pores and their properties, both structural and functional. In a recent series of works we employed radicals and other paramagnetic centres as spin probes to investigate broad range of porous materials. With the number of examples [1-15] we show that EPR allows obtaining plethora of topical information on porous materials, which is often inaccessible otherwise.

References:

- [1] D. M. Polyukhov, A. S. Poryvaev, S. A. Gromilov, M. V. Fedin, *Nano Letters* 19 (2019) 6506-6510.
- [2] A. Cadiou, N. Kolobov, S. Srinivasan, M. Goesten, H. Haspel, A. Bavykina, M. Tchalala, P. Maity, A. Goryachev, A. Poryvaev, M. Eddaoudi, M. Fedin, O. Mohammed, J. Gascon, *Angew. Chem. Int. Ed.* 59 (2020) 13468-13472.
- [3] A. S. Poryvaev, D. M. Polyukhov, M. V. Fedin, *ACS Appl. Mater. Interfaces* 12 (2020) 16655-16661.
- [4] D. M. Polyukhov, S. Krause, V. Bon, A. S. Poryvaev, S. Kaskel, M. V. Fedin, *J. Phys. Chem. Lett.* 11 (2020) 5856-5862.
- [5] O. D. Bakulina, M. Yu. Ivanov, S. A. Prikhod'ko, S. Pylaeva, I. V. Zaytseva, N. V. Surovtsev, N. Yu. Adonin, M. V. Fedin, *Nanoscale* 12 (2020) 19982-19991.
- [6] M. Yu. Ivanov, A. S. Poryvaev, D. M. Polyukhov, S. A. Prikhod'ko, N. Yu. Adonin, M. V. Fedin, *Nanoscale* 12 (2020) 23480-23487.
- [7] A. S. Poryvaev, E. Gjuzi, D. M. Polyukhov, F. Hoffmann, M. Fröba, M. V. Fedin, *Angew. Chem. Int. Ed.* 60 (2021) 8683-8688.
- [8] A. S. Poryvaev, A. A. Yazikova, D. M. Polyukhov, O. A. Chinak, V. A. Richter, O. A. Krumkacheva, M. V. Fedin, *J. Phys. Chem. C* 125 (2021) 15606-15613.
- [9] D. M. Polyukhov, A. S. Poryvaev, A. S. Sukhikh, S. A. Gromilov, M. V. Fedin, *ACS Appl. Mater. Interf.* 13 (2021) 40830-40836.
- [10] M. Yu. Ivanov, N. V. Surovtsev, M. V. Fedin, *Russ. Chem. Rev.* 91 (2022) RCR5031.
- [11] D. M. Polyukhov, N. A. Kudriavkyh, S. A. Gromilov, A. S. Kiryutin, A. S. Poryvaev, M. V. Fedin, *ACS Energy Lett.* 7 (2022) 4336-4341.
- [12] A. S. Poryvaev, E. Gjuzi, A. A. Yazikova, D. M. Polyukhov, Y. N. Albrekht, A. A. Efremov, N. A. Kudriavkyh, V. V. Yanshole, F. Hoffmann, M. Fröba, M. V. Fedin, *ACS Appl. Mater. Interf.* 15 (2023) 5191-5197.
- [13] A. Poryvaev, K. Larionov, Y. Albrekht, A. A. Efremov, A. S. Kiryutin, K. Smirnova, V. Yu. Evtushok, M. V. Fedin, *Phys. Chem. Chem. Phys.* 25 (2023) 13846-13853.
- [14] M. Yu. Ivanov, O. D. Bakulina, Y. F. Polienko, I. A. Kirilyuk, S. A. Prikhod'ko, N. Yu. Adonin, M. V. Fedin, *J. Mol. Liquids* 381 (2023) 121830.
- [15] A. S. Poryvaev, A. A. Efremov, D. V. Alimov, K. A. Smirnova, D. M. Polyukhov, R. Z. Sagdeev, S. Jacoutot, S. R. A. Marque, M. V. Fedin, *Chem. Sci.* 15 (2024) 5268-5276.