Krzysztof Banas, Ph.D.

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Employment History

2021 – present **Principal Research Fellow** Singapore Synchrotron Light Source, National University of Singapore

2007 – 2020 **Casual Laboratory Office, Research Scientist and Senior Research Fellow** Singapore Synchrotron Light Source, National University of Singapore

2004 – 2007 **Adjunct** Institute of Nuclear Physics Polish Academy of Sciences, Cracow, Poland

2002 – 2004 **Post-doc position - Marie Curie Fellowship** Faculty of Physics and Earth Science, University Leipzig, Germany. Project: *Diffusion-based Performance Optimization of Microporous Membranes and Particle*

1996 – 1997 **Research Assistant** Institute of Physics, Faculty of Mathematics and Physics Jagiellonian University, Cracow, Poland

Education

1997 – 2002 **Ph.D in Physics** Radiospectroscopy Department, Institute of Physics, Faculty of Mathematics and Physics, Jagiellonian University, Cracow, Poland

1991 – 1996 **M.Sc in Physics (with Distinctions)** Radiospectroscopy Department, Institute of Physics, Faculty of Mathematics and Physics Jagiellonian University, Cracow, Poland

Skills

Research Statistical multivariate methods for spectral data evaluation, dimension reduction, clustering and identification, Fourier transform infrared spectroscopy and microscopy, Nanoscale infrared spectroscopy and imaging, X-ray based imaging and tomography, X-ray fluorescence spectroscopy, Nuclear magnetic resonance relaxometry and spectroscopy, Magnetic resonance imaging

OS DOS, MS Windows, MacOS, Linux

Data Processing R Environment, RStudio, Origin, ImageJ, Opus, PyMCA, Gwydion

Coding R, LaTeX

Languages Polish (Native), English (Fluent), Russian and German (Basic)

Research Publications

Journal Articles

1 Banas, A., **Banas**, **K.**, Lo, M. K. F., Kansiz, M., Kalaiselvi, S. M. P., Lim, S. K., … Breese, M. B. H. (2020). Detection of high-explosive materials within fingerprints by means of optical-photothermal infrared spectromicroscopy. *Analytical Chemistry*, *92*(14), 9649–9657. PMID: 32567834.
doi:10.1021/acs.analchem.0c00938

2. Banas, A., **Banas**, **K.**, Lim, S. K., Loke, J., & Breese, M. (2020). Broad range ftir spectroscopy and multivariate statistics for high energetic materials discrimination. *Analytical Chemistry*, *92*(7), 4788–4797. PMID: 32125827. doi:10.1021/acs.analchem.9b03676

3. Mikhalchan, A., Tay, T. E., M., B., **Banas**, **K.**, Breese, M. B., Borkowska, A. M., … Paluszkiewicz, C. (2020). Development of continuous cnt fibre-reinforced pmma filaments for additive manufacturing: A case study by afm-ir nanoscale imaging. *Materials Letters*, *262*, 127182. doi:https://doi.org/10.1016/j.matlet.2019.127182

4. Cao, T., Mao, L., Qiu, Y., Lu, L., Banas, A., **Banas**, **K.**, … Chui, H.-C. (2019). Fano resonance in asymmetric plasmonic nanostructure: Separation of sub-10 nm enantiomers. *Advanced Optical Materials*. doi:https://doi.org/10.1002/adom.201801172

5. Pawlicki, B., Pawlicka, A., Banas, A., **Banas**, **K.**, Gajda, M., Dyduch, G., … Breese, M. B. H. (2018). Methodological approach for trace and essential elements assessment in prostate tissue by srixe method. *Folia Medica Cracoviensia*. doi:https://doi.org/10.24425/fmc.2018.124200

6. Dong, W., Qiu, Y., Zhou, X., Banas, A., **Banas**, **K.**, Breese, M. H. B., … Simpson, R. E. (2018). Tunable mid-infrared phase-change metasurface. *Advanced Optical Materials*. doi:https://doi.org/10.1002/adom.201701346

7. Mikhalchan, A., Banas, A., **Banas**, **K.**, Borkowska, A., Nowakowski, M., Breese, M., … Tay, T. E. (2018). Revealing chemical heterogeneity of cnt fiber nanocomposites via nanoscale chemical imaging. *Chemistry of Materials*. doi:10.1021/acs.chemmater.7b04065

8. **Banas**, **K.**, Banas, A., Heussler, S. P., & Breese, M. B. H. (2017). Influence of spectral resolution, spectral range and signal-to-noise ratio of fourier transform infra-red spectra on identification of high explosive substances. *Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy*, (188), 106–112. doi:10.1016/j.saa.2017.06.048

9. Banas, A., **Banas**, **K.**, Kalaiselvi, S. M. P., Pawlicki, P., Kwiatek, W. M., & H, B. M. B. (2017). Is it possible to find presence of lactose in pharmaceuticals? — preliminary studies by atr-ftir spectroscopy and chemometrics. *Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy*, *171*, 280–286. doi:10.1016/j.saa.2016.08.003

10. McDonald, G., Tavakkoli, E., Cozzolino, D., **Banas**, **K.**, Derrien, M., & Rengasamy, P. (2016). Field survey of total and dissolved organic carbon in alkaline soils of southern australia: Effect of ph and land management. *Soil Research*, *55*, 617–629. doi:https://doi.org/10.1071/SR16237

11. Vidhawan, S. A., Yap, A. U., Ornaghi, B. P., Banas, A., **Banas**, **K.**, Neo, J. C., … Rosa, V. (2015). Fatigue stipulation of bulk-fill composites: An in vitro appraisal. *Dental Materials*, *31*, 1068–1074. doi:10.1016/j.dental.2015.06.006

12. Wu, Q. Y. S., Tanoto, H., Ding, L., Chum, C. C., Wang, B., Chew, A. B., … Teng, J. (2015). Branchlike nano-electrodes for enhanced terahertz emission in photomixers. *Nanotechnology*, *26*, 255201. doi:10.1088/0957-4484/26/25/255201

13. **Banas**, **K.**, Banas, A., Gajda, M., Pawlicki, B., Kwiatek, W. M., & Breese, M. B. H. (2015). Pre-processing of fourier transform infrared spectra by means of multivariate analysis implemented in the r environment. *Analyst*, *140*(8), 2810–2814. doi:10.1039/c5an00002e

14. Banas, A., **Banas**, **K.**, Furgal-Borzych, A., Kwiatek, W. M., Pawlicki, B., & Breese, M. B. H. (2014). The pituitary gland under infrared light – in search of a representative spectrum for homogenous regions. *Analyst*, *140*(7), 2156–2163. doi:10.1039/c4an01985g

15. Reuben, S., **Banas**, **K.**, Banas, A., & Swarup, S. (2014). Combination of synchrotron radiation-based fourier transforms infrared microspectroscopy and confocal laser scanning microscopy to understand spatial heterogeneity in aquatic multispecies biofilms. *Water Research*, *64*, 123–133. doi:10.1016/j.watres.2014.06.039

16 **Banas**, **K.**, Banas, A., Gajda, M., Kwiatek, W. M., Pawlicki, B., & Breese, M. B. H. (2014). Performance assessment and beamline diagnostics based on evaluation of temporal information from infrared spectral datasets by means of r environment for statistical analysis. *Analytical Chemistry*, *86*(14), 6918–6923. doi:10.1021/ac500686w

17 Banas, A., **Banas**, **K.**, Breese, M. B. H., Loke, J., & Lim, S. K. (2014). Spectroscopic detection of exogenous materials in latent fingerprints treated with powders and lifted off with adhesive tapes. *Analytical and Bioanalytical Chemistry*, *406*(17), 4173–4181. doi:10.1007/s00216-014-7806-8

18 Banas, A., **Banas**, **K.**, Yang, P., Moser, H. O., Breese, M. B. H., Kubica, B., & Kwiatek, W. M. (2013). Environmental studies of iron in sediments by means of x-ray absorption spectroscopy. *International Journal of Environmental Research*, *8*(2), 263–272.

19 Wu, J., Moser, H. O., Xu, S., Jian, L., Banas, A., **Banas**, **K.**, … Breese, M. B. H. (2013). Functional multi-band thz meta-foils. *Scientific Reports*, *3*, 3531. doi:10.1038/srep03531

20 Wu, J., Moser, H. O., Xu, S., Banas, A., **Banas**, **K.**, Chen, H., & Breese, M. B. H. (2013). From polarization-dependent to polarization-independent terahertz meta-foils. *Applied Physics Letters*, *103*(19), 191114. doi:10.1063/1.4829575

21 **Banas**, **K.**, Banas, A. M., Gajda, M., Kwiatek, W. M., Pawlicki, B., & Breese, M. B. H. (2013). Analysis of synchrotron radiation induced x-ray emission spectra with r environment. *Radiation Physics and Chemistry*, *93*, 82–86. doi:10.1016/j.radphyschem.2013.04.026

22 Alaee, R., Menzel, C., Banas, A. M., **Banas**, **K.**, Xu, S., Chen, H., … Rockstuhl, C. (2013). Propagation of electromagnetic fields in bulk thz metamaterials: A combined experimental and theoretical study. *Physical Review B*, *87*, 075110. doi:http://dx.doi.org/10.1103/PhysRevB.87.075110

23 Peloso, M. P., Palina, N., **Banas**, **K.**, Banas, A., Hidayat, H., Hoex, B., … Aberle, A. G. (2012). Investigation of defect luminescence from multicrystalline si wafer solar cells using x-ray fluorescence and luminescence imaging. *Physica Status Solidi Rapid Research Letters*, *6*(12), 460–462. doi:10.1002/pssr.201206412

24 Banas, A., **Banas**, **K.**, Breese, M. B. H., Loke, J., Heng Teo, B., & Lim, S. K. (2012). Detection of microscopic particles present as contaminants in latent fingerprints by means of synchrotron radiation-based fourier transform infra-red micro-imaging. *Analyst*, *137*(15), 3459–65. doi:10.1039/c2an35355e

25 Banas, A. M., **Banas**, **K.**, Kwiatek, W. M., Gajda, M., Pawlicki, B., & Cichocki, T. (2011). Neoplastic disorders of prostate glands in the light of synchrotron radiation and multivariate statistical analysis. *Journal of Biological Inorganic Chemistry*, *16*(8), 1187–96. doi:10.1007/s00775-011-0807-6

26 Gajda, M., Kowalska, J., Banas, A. M., **Banas**, **K.**, Kwiatek, W. M., Kostogrys, R. B., … Appel, K. (2011). Distribution of selected elements in atherosclerotic plaques of apoe/ldlr-double knockout mice subjected to dietary and pharmacological treatments. *Radiation Physics and Chemistry*, *80*(10), 1072–1077. doi:10.1016/j.radphyschem.2011.02.021

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28 Moser, M. O., Jian, L. K., Chen, H. S., Bahou, M., Kalaiselvi, S. M. P., Virasawmy, S., … Hua, W. (2010). Thz meta-foil - a platform for practical applications of metamaterials. *Journal of Modern Optics*, *57*(19), 1936–1943. doi:10.1080/09500340.2010.499046

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30 **Banas**, **K.**, Banas, A. M., Moser, H. O., Bahou, M., Li, W., Yang, P., … Lim, S. K. (2010). Multivariate analysis techniques in the forensics investigation of the postblast residues by means of fourier transform-infrared spectroscopy. *Analytical Chemistry*, *82*(7), 3038–44. doi:10.1021/ac100115r

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33 Gajda, M., **Banas**, **K.**, Banas, A. M., Jawien, J., Mateuszuk, L., Chlopicki, S., … Chlopicki, S. (2008). Distribution of selected elements in atherosclerotic plaques of apoe/ldlr-double knockout mice assessed by synchrotron radiation-induced micro-xrf spectrometry. *X-Ray Spectrometry*, *37*(5), 495–502. doi:10.1002/xrs.1075

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35 **Banas**, **K.**, Jasinski, A., Banas, A. M., Gajda, M., Dyduch, G., Pawlicki, B., & Kwiatek, W. M. (2007). Application of linear discriminant analysis in prostate cancer research by synchrotron radiation-induced x-ray emission. *Analytical Chemistry*, *79*(17), 6670–6674. doi:10.1021/ac070931u

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39 Kwiatek, W. M., Banas, A., **Banas**, **K.**, Podgorczyk, M., Dyduch, G., Falkenberg, G., … Cichocki, T. (2006). Distinguishing prostate cancer from hyperplasia. *Acta Physica Polonica A*, *109*(3), 377–381. doi:10.12693/APhysPolA.109.377

40 **Banas**, **K.**, Banasik, T., Szczesniak-Fabianczyk, B., Gogol, P., Wierzuchowska, D., & Jasinski, A. (2006). Evaluation of boar spermatozoa motility by pulsed field gradient nmr. *Polish Journal of Chemistry*, *80*, 1075–1082.

41 Kwiatek, W. M., Banas, A., **Banas**, **K.**, Gajda, M., Galka, M., Falkenberg, G., & Cichocki, T. (2005). Iron and other elements studies in cancerous and non-cancerous prostate tissues. *Journal of Alloys and Compounds*, *401*(1-2), 178–183. doi:10.1016/j.jallcom.2005.03.090

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43 **Banas**, **K.**, Blicharska, B., Dietrich, W., & Kluza, M. (2000). Molecular dynamics of cellulose-water systems investigated by nmr relaxation method. *Holzforschung*, *54*(5), 501–504. doi:10.1515/HF.2000.085