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in Continuous Manufacturing and Crystallisation

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Research Council

Prof. Zoltan K Nagy



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Zoltan Nagy is a Research Professor in Process Systems Engineering at Loughborough University and he also holds a professorship in chemical engineering at Purdue University, USA. Previously, he worked at the University of Illinois at Urbana-Champaign (2001-2003) and at the University of Stuttgart (2003-2005). He has authored 4 books, 9 book chapters, more than 90 archival journal publications and over 130 peer-reviewed proceedings

papers, and organized numerous workshops and conferences in the areas of crystallization and control. Professor Nagy is Subject Editor (Pharmaceutical Engineering) for Chemical Engineering Research and Design, and Associate Editor for Control Engineering Practice, Journal of Process Control and Asia-Pacific Journal of Chemical Engineering. He received best paper awards from many journals and conferences, the Royal Academy of Engineering Excellence in Teaching Award (2007), Chemical Research Collaboration Success Award from the Council for Chemical Research (2009), and is a recipient of the prestigious European Research Council Fellowship (2011), for the project "CrySys – Crystallisation Systems Engineering - Towards a next generation of intelligent crystallization systems".

Research Interests

Professor Nagy's research interests include crystallisation systems engineering; population balance modelling, monitoring, optimization and advanced control of chemical processes in particular crystallization systems; as well as process analytical technologies. Dr. Nagy has developed several innovative crystallisation control approaches, such as the model-free direct nucleation control (DNC) technique, as well as nonlinear model predictive control approaches for the control of crystal size and shape distribution and polymorphic form in batch and continuous crystallisation processes. He is the developer of the Crystallization Process Informatics System (CryPRINS), an intelligent decision

support and control system for crystallization processes, that implements the novel concept of quality-by-control (QbC) for crystallization systems.

Representative Publications

Z. K. Nagy, M. Fujiwara, R. D. Braatz, Monitoring and advanced control of crystallization processes, D. Erdemir, A. Lee, A. Myerson (eds) Handbook of Industrial Crystallization, 3rd edition, Cambridge University Press, 2013, in press.

Z. K. Nagy, R. D. Braatz, Advances and new directions in crystallization control, Annu. Rev. Chem. Biomol. Eng., 3, 55-75, 2012.

Z. K. Nagy, E. Aamir, Systematic design of supersaturation controlled crystallization processes for shaping the crystal size distribution using an analytical estimator, Chemical Engineering Science, 84, 656-670, 2012.

E. Aamir, C.D. Rielly, Z. K. Nagy, Experimental evaluation of the targeted direct design of temperature trajectories for growth dominated crystallization processes using an analytical crystal size distribution estimator, Ind. Eng. Chem. Res., 51 (51), 16677-16687, 2012.

A. N. Saleemi, G. Steele, N. Pedge, A. Freeman, Z. K. Nagy, Enhancing crystalline properties of a cardiovascular active pharmaceutical ingredient using a Process Analytical Technology based crystallization feedback control strategy, International Journal of Pharmaceutics, 430, 56-64, 2012.

A. N. Saleemi, C. D. Rielly, Z. K. Nagy, Comparative investigation of supersaturation and automatic direct nucleation control of crystal size distributions using ATR-UV/Vis spectroscopy and FBRM, Crystal Growth and Design, 12(4), 1792-1807, 2012.

V. Kariwala, Y. Cao, Z. K. Nagy, Automatic differentiation-based quadrature method of moments for solving population balance equations, AIChE J., 58(3), 842-854, 2012.

Z. K. Nagy, E. Aamir, C. D. Rielly, Internal fines removal using a population balance model based control of crystal size distribution under dissolution, growth and nucleation mechanisms, Crystal Growth and Design, 11, 2205-2219, 2011.

Z. K. Nagy, Model based robust control approach for batch crystallization product design, Computers and Chemical Engineering, 33, 1685-1691, 2009

M. R. Abu Bakar, Z. K. Nagy, A. N. Saleemi, C. D. Rielly, The impact of direct nucleation control on crystal size distribution in pharmaceutical crystallization processes, Crystal Growth and Design, 9 (3), 1378-1384, 2009.