

NAME AND CONTACT DETAILS	
Name:	Professor Gavin Walker
Address:	Bernal Institute, University of Limerick
E:	gavin.walker@ul.ie
W:	www.bernalinstitute.com

CAREER PROFILE	
Education	
1988-1992	BEng (Chemical Engineering) Queens University Belfast (QUB)
1992-1995	PhD (Chemical Engineering) QUB
1999	Corporate Member IChemE
2000	PGCHET (QUB)
2007	Fellow IChemE
Employment	
2012-date	Bernal Chair of Pharmaceutical Powder Engineering, UL
2012-date	Visiting Research Professor, QUB
2012	Professor of Chemical Engineering, QUB
2010-2012	Reader / Associate Professor in Chemical Engineering, QUB
2003-2010	Senior Lecturer in Chemical Engineering, QUB
1998-2003	Lecturer in Chemical Engineering, QUB
1995-1998	Process Engineer (ICI)

INNOVATION/COMMERCIALISATION ACTIVITY	
<p>Industrial Collaborations: Successful collaboration on research projects with numerous international manufacturing companies and has industrially funded research projects which have delivered improvements: in product quality (BP Chemicals, via continuous distillation); new processes (AstraZeneca, via microwave drying PAT); energy/environmental efficiency (ExxonMobil and Bombardier Aerospace, via new adsorption processes); new product developments (P&G, via a new encapsulation system; SABIC, via controlled release product), powder engineering (Roche, GSK, Pfizer, powder flow prediction). Several Enterprise Ireland Innovation Partnership Projects with, J&J, Pfizer, Lilly, Janssen, Allergan, Sanofi, Sun Pharma and MSD.</p>	
<p>Invention Disclosures:</p> <ol style="list-style-type: none"> 1. 2016 Supercritical Processing of Pharmaceutical Powders, 2016-UL-034-I 2. 2017 Continuous Drying of Active Pharmaceutical Ingredients using a Twin Screw Technology, 2017-UL-013-1 	
<p>Patents (Awarded/Pending):</p> <ol style="list-style-type: none"> 1. Walker, G., Buchanan F., Walsh, P., Maggs, C. & Dring, M. (2010) Process for preparing hydroxylapatite. US Patent application number 20100015025. 2. Walker G. (2008) Skin Device. UK Patent application number P106924.GB.0 3. Walker, G., Buchanan F., (2009) Implantable substrate. UK Patent application number P102838.GB.001 4. Walker, G., Mangwandi C., Allen S. (2011) Controlled release fertiliser. UK Patent application number P1113313.9 	

Spin Out Activities:

Spin out company formed with QUBIS (2013), “AD FerTech” for manufacture of controlled release granular fertiliser. Company awarded €1.2M from UK Technology Strategy Board, SBRI - Greenius (Cabinet Office) Competition.

Spin out company with UL (2017) “IP2 Innovative Particle Processing” for cross-sectoral powder engineering consultancy.

Other Innovation/Commercialisation Activities:

1. 2008 Invest NI Proof of Concept Project 15A “Bone Tissue Engineering”
2. 2009 Invest NI Proof of Concept Project 131 “AD treatment Processes”
3. 2011 Invest NI Proof of Concept Project 201 “Applications of SHP materials”
4. 2013 Invest NI Proof of Concept Project 301 “Heat transfer using SHP surfaces”

KEY ACHIEVEMENTS (RESEARCH AND IMPACT)

1. Prof Walker was Institutional Director of the Erasmus Mundus Masters Programme, ME3, and “Masters in Engineering, Environment and Energy” at Queen’s University Belfast. The programme hosted 40 international students per year in UK, France, Spain Hungary and Sweden. The research collaborations fostered in the programme led to more than 20 international journal publications, which motivated Prof Walker to form the spin-out company, “AD FerTech” (see under Spin Out Activities above).
2. Prof Walker was awarded the prestigious Leverhulme Trust Senior Research Fellowship by the Royal Academy of Engineering in 2009 for his work on pharmaceutical processing, identifying him as one of the top engineering researchers in the UK. The work was based on developing Raman Spectroscopic techniques for continuous processing, which was published in Chemical Engineering Science and Chemical Engineering Journal. He was also the recipient of a Royal Academy of Engineering (UK) ExxonMobil fellowship in 2002.
3. Prof. Walker leads collaboration with Prof. Stuart James in Queen’s University Belfast on designing continuous processes for mechano-synthesis. This has led to Prof. Walker’s SFI Investigators award, collaboration through EPSRC and a recent publication in Green Chemistry.
4. Prof. Walker published more than 10 international journal papers on novel adsorption reaction mechanisms - work which was funded through a Horizon 2020 Marie Curie ITN project, No. 238273 and titled ATWARM, involving collaboration between 7 EU environmental engineering research centres.
5. Prof Walker has two patent applications through a FP7 funded STREP Project HIPPOCRATES (NMP3-CT-2003-505758), which also led to 3 publications in Chemical Engineering Journal, of which Prof Walker is Associate Editor.

Other Areas of Impact:

Prof. Walker is the Project Leader of the €3m SSPC Spoke Project, The Modelling of Multi-Phase Transport Processes to Enable Automation in Manufacturing (MOMEnTUM) Spoke Project is centred along agnostic themes in specific areas of process modelling to enable and control automation within “substance” processing and consists of 8 PDRAs and 3 PhD students. This project engages regularly at a corporate level and monthly project progress meetings often include attendance from the Johnson & Johnson’s Vice President Process

Science and Advanced Analytics, Senior Director Supply Chain Manufacturing Engineering & Technology, Senior Director, Global Technical Lead, OTC and Director Liquids Manufacturing Standards and COE at J&J Consumer Products. This level of interest highlights the perceived value of the research project within J&J corporate and the potential for its commercial impact.

Prof. Walker is involved with two Enterprise Ireland-funded Technology Centres – “Pharmaceutical Manufacturing Technology Centre” (PMTC), based at the University of Limerick, where he is a Principal Investigator and Academic Host. It is focused on pharmaceutical process innovation and advanced manufacturing in particular advanced and rapid micro-analytical techniques, control of continuous processing, soft sensor modelling tools and API real time release. Total PMTC research income to date is >€8m with 25 industry partners. Secondly, the “Dairy Processing Technology Centre” (DPTC) also hosted at the University of Limerick in which he again is a Principal Investigator and a Pillar Leader. DPTC has a total research income of >€25m funding, 30 post-docs over 5 years and focuses on cost competitiveness in dairy processing, process quality and safety by design and environmental sustainability towards a zero emissions Irish dairy industry.

Prof. Walker (FIChemE) was appointed as the Bernal Chair of Pharmaceutical Engineering at the University of Limerick in 2012. He is also a Visiting Research Professor of Chemical Engineering at Queen’s University Belfast (UK). Professor Walker has been awarded >€25m in research funding from SFI, EI, EPSRC (UK), TSB (UK), EU and industry sources.

His research interests include particle/powder technology, process modelling and pharmaceutical engineering; he currently has 40 researchers within his group. He has published over 151 international journal papers (>4100 citations, h-index 31) on various aspects of chemical and process engineering and is associate editor of Chemical Engineering Journal and Chemical Engineering Research and Design (focusing on material processing).

PUBLICATIONS																																													
Total No. of Publications: 262	Senior Author Publications: 229	h-Index: 31	Total no. of citations: 4122	Source of citation data: Scopus																																									
Journal Articles: 154	Reviews: 2	Book Chapters: 3	Books: 0	Conference associated publications: >100	Other: 4 Patents 1 Editorial																																								
<p><u>Selected senior author publications</u> <u>(* Senior author publications)</u></p>		<table border="1"> <caption>Citations by Year, Walker, Gavin, M (Source: Scopus)</caption> <thead> <tr> <th>Year</th> <th>Citations</th> </tr> </thead> <tbody> <tr><td>1998</td><td>0</td></tr> <tr><td>1999</td><td>0</td></tr> <tr><td>2000</td><td>0</td></tr> <tr><td>2001</td><td>0</td></tr> <tr><td>2002</td><td>0</td></tr> <tr><td>2003</td><td>0</td></tr> <tr><td>2004</td><td>0</td></tr> <tr><td>2005</td><td>0</td></tr> <tr><td>2006</td><td>0</td></tr> <tr><td>2007</td><td>0</td></tr> <tr><td>2008</td><td>0</td></tr> <tr><td>2009</td><td>0</td></tr> <tr><td>2010</td><td>0</td></tr> <tr><td>2011</td><td>0</td></tr> <tr><td>2012</td><td>0</td></tr> <tr><td>2013</td><td>0</td></tr> <tr><td>2014</td><td>0</td></tr> <tr><td>2015</td><td>0</td></tr> <tr><td>2016</td><td>0</td></tr> </tbody> </table>				Year	Citations	1998	0	1999	0	2000	0	2001	0	2002	0	2003	0	2004	0	2005	0	2006	0	2007	0	2008	0	2009	0	2010	0	2011	0	2012	0	2013	0	2014	0	2015	0	2016	0
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<p>1. Kinetic and thermodynamics of chromium ions adsorption onto dolomite adsorbents, Albadarin, A.B., Mangwandi, C., Al-Muhtaseb, A.H., Allen, S.J., Walker, G.M.*, Ahmad, M.N.M., (2012). <i>Chemical Engineering Journal</i>, 179, pp. 193-202. DOI: 10.1016/j.cej.2011.10.080, [Cited 164, IF = 5.310] [3rd most cited paper in this journal since 2012]. Novel data on dolomitic adsorption processes and led to Prof Walker forming a university spin-out company in 2013, “ADFerTech” for the manufacture of controlled release fertiliser (www.adfertech.com).</p>																																													
<p>2. Effect of solution pH, ionic strength, and temperature on adsorption behavior of reactive dyes on activated carbon, Al-Degs, Y.S., El-Barghouthi, M.I., El-Sheikh, A.H., Walker, G.M.,* (2008). <i>Dyes and Pigments</i>, 77 (1), pp. 16-23. DOI: 10.1016/j.dyepig.2007.03.001, [Cited 474, IF = 4.055] [Top cited paper in this journal since 2008]. Novel investigation on the engineering science surrounding the area of the adsorption of large molecules onto activated carbon and was a result of international collaboration with Universities in Lebanon and Qatar leading to QNRF research.</p>																																													
<p>3. Sorption of Zn(II), Pb(II), and Co(II) using natural sorbents: Equilibrium and kinetic studies, Al-Degs, Y.S., El-Barghouthi, M.I., Issa, A.A., Khraisheh, M.A., Walker, G.M.,* (2006). <i>Water Research</i>, 40 (14), pp. 2645-2658. DOI: 10.1016/j.watres.2006.05.018 [Cited 234, IF = 5.323] [Top 1% most cited paper in journal since 2006]. Investigates innovative multicomponent mass transfer processes with nano-porous material and was a result of international collaboration with Universities in Qatar.</p>																																													
<p>4. Adsorption of Methylene Blue onto activated carbon produced from steam activated bituminous coal: A study of equilibrium adsorption isotherm, El Qada, E.N., Allen, S.J., Walker, G.M.,* (2006). <i>Chemical Engineering Journal</i>, 124 (1-3), pp. 103-110. DOI: 10.1016/j.cej.2006.08.015 [Cited 219 times, IF = 5.310] [23rd most cited paper in this journal since 2006]. Paper described the mathematical modelling equilibrium mass transfer within novel powdered materials</p>																																													
<p>5. Adsorption of basic dyes from aqueous solution onto activated carbons, El Qada, E.N., Allen, S.J., Walker, G.M.,* (2008). <i>Chemical Engineering Journal</i>, 135 (3), pp. 174-184. DOI: 10.1016/j.cej.2007.02.023, [Cited 200, IF = 5.310] [15th most cited paper in this journal since 2008]. Paper investigates the engineering applications of novel activated carbons synthesised at QUB. This publication led to Prof Walker as guest editor of this special issue in <i>Chemical Engineering Journal</i> on powder processes.</p>																																													
<p>6. Dilute acid hydrolysis of lignocellulosic biomass. Lenihan, P., Orozco, A., O'Neill, E., Ahmad, M.N.M., Rooney, D.W., Walker, G.M.,* (2010). <i>Chemical Engineering Journal</i>,</p>																																													

156(2), pp. 395-403. DOI: 10.1016/j.cej.2009.10.061, [Cited 138, IF = 5.310] [25th most cited paper in this journal since 2010]. First published results for phosphoric acid-catalyzed hydrolysis using rigorous experimental techniques; the project was funded by H2020 Marie Curie ITN project 238273 ATWARM.

7. Adsorption mechanisms of removing heavy metals and dyes from aqueous solution using date pits solid adsorbent. Al-Ghouti, M.A., Li, J., Salamh, Y., Al-Laqtah, N., Walker G.M.,* Ahmad, M.N.M., (2010) Journal of Hazardous Materials, 176(1-3), pp.510-520. DOI:10.1016/j.jhazmat.2009.11.059 [Cited 87, IF = 5.950] [Top 3% most cited paper in this journal since 2010]. First paper on novel adsorption reaction mechanism; funded through EU H2020 MSCA ITN project ATWARM
8. Competitive adsorption of reactive dyes from solution: Equilibrium isotherm studies in single and multisolute systems. Al-Degs, Y., Khraisheh, M.A.M., Allen, S.J., Ahmad, M.N., Walker, G.M.* (2007). Chemical Engineering Journal, 128(2-3), pp.163-167. DOI: 10.1016/j.cej.2006.10.009. [Cited 76, IF = 5.310] [Top 3% most cited paper in this journal since 2007]. First paper to model reactive dye adsorption using a multisolute model, and was a result of international collaboration with University College London.
9. Dilute acid hydrolysis of cellulose and cellulosic bio-waste using a microwave reactor system. Orozco, A., Ahmad, M., Rooney, D., Walker, G.M.* (2007). Process Safety and Environmental Protection, 85(5 B), 446-449. DOI: 10.1205/psep07003 [Cited 61, IF = 2.551] [Top 1% most cited paper in this journal since 2007]. First paper to use novel microwave techniques for this reaction, funded by EU Marie Curie ITN ATWARM.
10. Liquid marble formation using super-hydrophobic powders, McEleney, P., Larmour, I.A., Bell, S.E.J., Walker G.M.,* (2009). Chemical Engineering Journal, 147, pp. 373-382. DOI: 10.1016/j.cej.2008.11.026 [Cited 53, IF= 5.310] [Top 3% most cited paper in this journal, > 2009]

Other Publications

1. Deborah E. Crawford Clodagh K. G. Miskimmin Ahmad B. Albadarin Gavin Walker Stuart L. James, Organic synthesis by Twin Screw Extrusion (TSE): continuous, scalable and solvent-free, Green Chemistry, 10.1039/C6GC03413F (IF = 8.506)
2. Asghar, M.A., Ahmed, A., Zahir, E., Asghar, M.A., Iqbal, J., Walker, G.* Incidence of aflatoxins contamination in dry fruits and edible nuts collected from Pakistan (2017) Food Control, 78, pp.169-175. (IF=3.388)
3. Shirazian, S., Kuhs, M., Darwish, S., Croker, D., Walker, G.M.,* Artificial neural network modelling of continuous wet granulation using a twin-screw extruder (2017) International Journal of Pharmaceutics, 521 (1-2), pp. 102-109. (IF = 3.650)
4. Romeih, E., Walker, G.,* Recent advances on microbial transglutaminase and dairy application (2017) Trends in Food Science and Technology, 62, pp. 133-140. (IF = 5.150)
5. Davis, M.T., Potter, C.B., Mohammadpour, M., Albadarin, A.B., Walker, G.M.,* Design of spray dried ternary solid dispersions comprising itraconazole, soluplus and HPMCP: Effect of constituent compositions(2017) International Journal of Pharmaceutics, 519 (1-2), pp. 365-372. (IF=3.650)
6. Albadarin, A.B., Lewis, T.D., Walker, G.M.,* Granulated polyhalite fertilizer caking propensity (2017) Powder Technology, 308, pp. 193-199. (IF = 2.759)
7. Sajjia, M., Shirazian, S., Kelly, C.B., Albadarin, A.B., Walker, G., * ANN Analysis of a Roller Compaction Process in the Pharmaceutical Industry (2017) Chemical Engineering and Technology, 40 (3), pp. 487-492. (IF = 2.385)
8. Kuhs, M., Moore, J., Kollamaram, G., Walker, G.,* Croker, D., Predicting optimal wet granulation parameters for extrusion-spheronisation of pharmaceutical pellets using a mixer torque rheometer, (2017) International Journal of Pharmaceutics, 517 (1-2), pp. 19-24. (IF=3.65)
9. Souness, A., Zamboni, F., Walker, G.M., Collins, M.N., Influence of scaffold design on 3D printed cell constructs (2017) Journal of Biomedical Materials Research - Part B Applied Biomaterials, Article in Press. Cited 1 time. (IF = 2.520)

10. Albadarin, A.B., Collins, M.N., Naushad, M., Shirazian, S., Walker, G., Mangwandi, C. Activated lignin-chitosan extruded blends for efficient adsorption of methylene blue (2017) *Chemical Engineering Journal*, 307, pp. 264-272. Cited 4 times. (IF = 5.310)
11. Sajjia, M., Albadarin, A.B., Walker, G.,* Statistical analysis of industrial-scale roller compactor 'Freund TF-MINI model' (2016) *International Journal of Pharmaceutics*, 513 (1-2), pp. 453-463.
12. Grau-Bove, J., Mangwandi, C., Walker, G., Ring, D., Cronin, K., Studies into the effect of temperature on the impact of model particles in co-melt granulation (2016) *Powder Technology*, 294, pp. 411-420. (IF = 2.759)
13. Davis, M.T., Egan, D.P., Kuhs, M., Albadarin, A.B., Griffin, C.S., Collins, J.A., Walker, G.M., * Amorphous solid dispersions of BCS class II drugs: A rational approach to solvent and polymer selection, (2016) *Chemical Engineering Research and Design*, 110, pp.192-199.
14. Douglas, P., Kuhs, M., Sajjia, M., Khraisheh, M., Walker, G.,* Collins, M.N., Albadarin, A.B., Bioactive PCL matrices with a range of structural & rheological properties (2016) *Reactive and Functional Polymers*, 101, pp. 54-62. (IF = 3.102)
15. Douglas, P., Albadarin, A.B., Sajjia, M., Mangwandi, C., Kuhs, M., Collins, M.N., Walker, G.M.,* Effect of poly ethylene glycol on the mechanical and thermal properties of bioactive poly(ϵ -caprolactone) melt extrudates for pharmaceutical applications (2016) *International Journal of Pharmaceutics*, 500 (1-2), pp. 179-186. Cited 2 times. (IF = 3.650)
16. Clarke, S.A., Choi, S.Y., McKechnie, M., Burke, G., Dunne, N., Walker, G., Cunningham, E., Buchanan, F., Osteogenic cell response to 3-D hydroxyapatite scaffolds developed via replication of natural marine sponges, (2016) *Journal of Materials Science: Materials in Medicine*, 27 (2), art. no. 22, pp. 1-11. (IF = 2.516)
17. Mirza, Z., Liu, J., Glocheux, Y., Albadarin, A.B., Walker, G.M.,* Mangwandi, C., Effect of impeller design on homogeneity, size and strength of pharmaceutical granules produced by high-shear wet granulation, (2015) *Particuology*, 23, pp. 31-39. Cited 2 times. (IF = 2.103)
18. Cunningham, E., Walker, G., Buchanan, F., Dunne, N., Bio-Inspired Calcium Phosphate Materials for Hard-Tissue Repair, (2015) *Biomaterialization and Biomaterials: Fundamentals and Applications*, pp. 405-442. (IF = 3.256)
19. Potter, C., Tian, Y., Walker, G., McCoy, C., Hornsby, P., Donnelly, C., Jones, D.S., Andrews, G.P., Novel supercritical carbon dioxide impregnation technique for the production of amorphous solid drug dispersions: A comparison to hot melt extrusion (2015) *Molecular Pharmaceutics*, 12 (5), pp. 1377-1390. Cited 7 times. (IF = 4.384)
20. Douglas, P., Albadarin, A.B., Al-Muhtaseb, A.H., Mangwandi, C., Walker, G.M.,* Thermo-mechanical properties of poly ϵ -caprolactone/poly l-lactic acid blends: Addition of nalidixic acid and polyethylene glycol additives (2015) *Journal of the Mechanical Behavior of Biomedical Materials*, 45, pp. 154-165. Cited 7 times. (IF = 2.984)
21. McAuliffe, M.A.P., Omahony, G.E., Blackshields, C.A., Collins, J.A., Egan, D.P., Kiernan, L., O'Neill, E., Lenihan, S., Walker, G.M., Crean, A.M., The use of PAT and off-line methods for monitoring of roller compacted ribbon and granule properties with a view to continuous processing, (2015) *Organic Process Research and Development*, 19(1), pp.158-166. Cited 3 times.
22. Cunningham, E., Dunne, N., Walker, G., Buchanan, F., High-solid-content hydroxyapatite slurry for the production of bone substitute scaffolds (2015) *Proceedings of the Institution of Mechanical Engineers, Part H: Journal of Engineering in Medicine*, 223 (6), pp. 727-737.
23. Mangwandi, C., JiangTao, L., Albadarin, A.B., Dhenge, R.M., Walker, G.M.,* High shear granulation of binary mixtures: Effect of powder composition on granule properties (2015) *Powder Technology*, 270 (PB), pp. 424-434. Cited 3 times. (IF = 2.759)
24. Glocheux, Y., Albadarin, A.B., Mangwandi, C., Stewart, E., Walker, G.M.,* Production of porous aluminium and iron sulphated oxyhydroxides using industrial grade coagulants for optimised arsenic removal from groundwater, (2015) *Journal of Industrial and Engineering Chemistry*, 25, pp. 56-66. Cited 6 times. (IF = 2.315)