



Technology References

Literature references to research into PC Technology as a biocompatible coating with reduced protein adsorption, bacterial adhesion and improved blood compatibility for medical devices

Fundamental Research

1. Pons, M., Johnston, D.S., Chapman D., A Study of the Spectra of Diacetylenic Phospholipid Polymers in Solvents and Dispersions, *J Polymer Science: Polymer Chemistry Edition*
2. Pons, M., Villaverde, C., Chapman, D., A ¹³C-NMR Study of 10, 12-Tricosadiynoic Acid and the Corresponding Phospholipid and Phospholipid Polymer, *Biochimica et Biophysica Acta*
3. Durrani A.A., Hayward J.A. et al, Biomembranes as Models for Polymer Surfaces II, *Biomaterials*, **1986**
4. Hayward J.A., Durrani A.A. et al, Biomembranes as Models for Polymer Surfaces III, *Biomaterials*, **1986**
5. Hayward J.A., Durrani A.A. et al, Biomembranes as Models for Polymer Surfaces IV, *Biomaterials*, **1986**
6. Russell J.C., Jones J.R. et al, The Preparation of Tritium Labelled Biocompatible Polymers, *J Labelled Compounds/Radiopharmaceuticals*
7. Browne J., Russell J., Bowers R., and Charles S., The Synthesis of Small Molecule Phosphorylcholine Compounds for use in Biocompatibility Applications, *Phosphorus, Sulfur and Silicon*
8. Ewan J. Campbell and Aine Jamieson, In-Vitro Elisa for the Detection of Contact Activation by Biomaterials, *Poster presented at 21st Annual Meeting of the Society For Biomaterials*
9. Groth T., Campbell E.J., Herrmann K., Seifert B., Application of Enzyme Immunoassays for Testing Haemocompatibility of Biomedical Polymers, *Biomaterials*, **1995**
10. Ishihara K., Nomura H. et al, Why do phospholipid polymers reduce protein adsorption? , *J Biomed Mater Res*, **1998**
11. Cumberland D.C., Gunn J. et al, Biomimcry 1: PC, *Semin Intervent Cardiol*, **1998**
12. Steward A.G., Haddleton D.M., Muir A.V.G., Willis S.L., Catalytic Chain Transfer Polymerisation of Functional Methacrylates, *ACS*, **1998**
13. Murphy E.F. Keddie J.L. et al, The reduced adsorption of lysozyme at the phosphorylcholine incorporated polymer/aqueous solution interface studied by spectroscopic ellipsometry, *Biomaterials*, **1999**
14. Lewis A., Stokes H.C.K., Formation of a stabilised phospholane salt, *J Chem Research*, **1999**
15. Nakaya T., Li J.Y., Phospholipid polymers, *Prog polym Sci*, **1999**
16. Clarke S., Davies M.C. et al, Surface mobility of 2-methacryloyloxyethyl phosphorylcholine-co-lauryl methacrylate polymers, *American Chemical Soc, Langmuir*
17. Browne J.E., Freeman R.T. et al, On the preparation of some phospholipid analogues, *J Chem Soc, Perkin Trans*, **2000**
18. Murphy E.F., Lu J.R. et al, Characterization of protein adsorption at the phosphorylcholine incorporated polymer-water interface, *Macromolecules*, **2000**
19. Wang Y., Ju Su T. et al, Covalent coupling of a phospholipid monolayer on the surface of ceramic materials, *Royal Society of Chemistry*, **2000**
20. Clarke, S., Davies, M.C., Lewis, A.L., O'Byrne, V., Roberts, C.J., Tendler, S.J.B., Williams, .M., Novel biomimetic polymers incorporating phosphorylcholine, *J Pharm Pharmacol*, **2000**

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21. Lobb, E.J., Ma I, Billingham, N.C., Armes S.P. & Lewis A.L. , Facile Synthesis of Well-Defined, Biocompatible Phosphorylcholinebased methacrylate copolymers via atom transfer radical polymerisation at 20 °C, *J Am Chem Soc*, **2001**
22. Clarke, S., Davies, M.C., Roberts C.J., Tendler, S.J.B., Williams, P.M., Lewis, A.L. & O'Byrne, V., Atomic force microscope and surface plasmon resonance investigation of polymer blends of poly([2-methacryloyloxy)ethyl] phosphorylcholine-co-lauryl methacrylate) and poly(lauryl methacrylate), *Macromolecules*, **2001**
23. Tang, Y., Lu, J.R., Lewis, A.L., Vick, T.A. & Stratford, P.W., Swelling of zwitterionic polymer films characterised by spectroscopic ellipsometry, *Macromolecules*, **2001**
24. Lewis, A.L., Cumming, Z.H., Goreish, H.H., Kirkwood, L.C., Tolhurst, L.A., Stratford, P.A., Crosslinkable Coatings from Phosphorylcholine-Based Polymers, *Biomaterials*, **2001**
25. Tang Y., Lu J.R., Lewis A.L., Vick, T.A., Stratford P.W., Structural Effects on Swelling of Thin Phosphorylcholine Polymer Films, *Macromolecules*, **2002**
26. Ma Y., Tang Y., Billingham N.C., Armes S.P., Lewis A.L., Lloyd A.W., Salvage J.P., Well-defined biocompatible block copolymers via atom transfer radical polymerisation of 2-methacryloyloxyethyl phosphorylcholine in protic media, *Macromolecules*, **2003**
27. Long S.F., Clark S., Davies M.C., Lewis A.L., Hanlon G.W., Lloyd A.W., Controlled biological response on blends of a phosphorylcholine-based copolymer with poly(butyl methacrylate), *Biomaterials*, **2003**

Applied Research

1. Hayward J.A., Lee D.C., Chapman D., Recent Studies of Biomembranes and Phospholipid Polymers, *Front Membr Res Agric*, **1985**
2. Durrani A.A., Chapman D., Modification of Polymer Surfaces for Biomedical Applications, *Polymer Surfaces and Interfaces*
3. Hall B., Bird R.R. et al, Biomembranes as Models for Polymer Surfaces V, *Biomaterials*, **1989**
4. Chapman, D., Bird R., Hall B., Haris P., Jackson M., Biomembranes: Basic Science and Future Technology, *Biological and Synthetic Membranes*
5. Haris P.I., Hall B., Bird R.R., Chapman D., Recent Studies on Biomembrane Structure and Biomaterials, *Horizons in Membrane Biotechnology*
6. Chapman D., Charles S.A., A Coat of Many Lipids - In the Clinic, *Chemistry in Britain*, **1992**
7. Campbell E.J., Wiles M.C. et al, A New Enzyme Immunoassay for the Activation of Platelets by Biomaterials: Reduced Activation by Phosphorylcholine-Coated Surfaces, *Mater Res Soc Symp Proc*, **1992**
8. Yianni Y.P., Biocompatible Surfaces Based Upon Biomembrane Mimicry. Eds. P J Quinn & R J Cherry, *Structural and Dynamic Properties of Lipids and Membranes*, **1992**
9. Hall B., Pearce DJ. Et al, Enzyme-Linked Immunosorbent Assays for Biocompatibility Testing, *The reference materials of the European Communities: Results of haemocompatibility tests*, **1992**
10. Dudley L.Y., Stratford P. et al, Coatings for the Prevention of Fouling of Microfiltration Membranes, *Trans IChemE*, **1993**
11. Campbell E.J., O'Byrne V. et al, Biocompatible Surfaces Using Methacryloylphosphorylcholine Laurylmethacrylate Copolymer, *ASAIO Journal*, **1994**
12. Faragher R.G.A., Bowers R.W.J., Denyer S.P., Dropcova S., Gard P.R., Hall B., Jones S.A., Lloyd A.W., Mikhailovsky S.V., Olliff C.J., Riding M., Rosen P.H., In-Vitro Evaluation of Novel Biomimetic Hydrogels: Potential New Base Materials for Intraocular Lenses, *J Pharm Pharmacol*, **1995**
13. Browne J.E., Chapman D. et al, Biocompatible phosphorylcholine treated surfaces for membrane studies, *21st Ann. meeting of the Society for Biomaterials*

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14. Bryan G. Reuben, Orly Perl, Neil L. Morgan, Peter Stratford, Linda Y. Dudley, Christopher Hawes. , Phospholipid Coatings for the Prevention of Membrane Fouling, *J Chem Tech Biotechnol*, **1995**
15. Yianni J.P., Making PVC more Biocompatible, *Medical Device Technology*, **1995**
16. Akhtar S., Hawes C., Dudley L, Reed I, Stratford P., Coatings reduce the fouling of microfiltration membranes, *J Membrane Science*, **1995**
17. Lloyd A.W., Dropcova S., Mikhailovsky S.V., Denyer S.P., Gard P.R., Hanlon G.W. Olliff C.J., Faragher R.G.A., Bowers R.W.J., Hall B., Muir A., Jones S., Rosen P., Riding M., A Biocompatible Coating for IOLs, *Vision Research*, **1996**
18. Lloyd A.W., Bowers R.W.J., Dropcova S., Denyer S.P., Faragher R.G.A., Gard P.R., Hall B., Hanlon G.W., Jones S.A., Muir A., Olliff C.J., Rosen P.H., Riding M., In-vitro evaluation of novel biomimetic intraocular lens materials, *Investigative Ophthalmology and Visual Science*
19. Hanlon G.W., Bowers R.W.J., Dropcova S., Denyer S.P., Faragher R.G.A., Gard P.R., Hall B., Jones S.A., Lloyd A.W., Muir A., Olliff C.J., Rosen P.H., Riding M., In-vitro evaluation of a novel biocompatible intraocular lens coating, *Investigative Ophthalmology and Visual Science*
20. Wood S.J., Choong S.K.S. et al, Phosphorylcholine: A hydrophilic coating that does not increase encrustation, *J of Endourology*, **1998**
21. Denyer S.P., Dropcova S., Faragher R.G.A., Gard P.R., Hanlon G.W., Lloyd A.W., Mikhailovsky S.V., Olliff C.J., Letko E., Filipiec M., In Vitro Biocompatibility Testing of Intraocular Biomaterials, *Ocular Radiation Risk Assessment in Populations Exposed to Environmental Radiation Contamination (A.J. Junk et al. Eds)*, **1998**
22. Russell J.C., The Use of Phosphorylcholine Materials in Long Term *In Vitro* Studies, *J Endourology*, **1998**
23. von Segesser L.K., Tkebuchava T. et al, Biomembrane mimicry provides improved thromboresistance for total artificial hearts, *ASAIO Journal*, **1999**
24. Chinn J. Mabrey J., Fashion Platelets: New coats for coronary stents, *Medical Device & Diagnostic*
25. Tolhurst L.E., The analysis of post implant phosphorylcholine coatings on BiodivYsio cardiovascular stents by AFM, *Proceedings of the Medical Device Technology Conference*
26. Lloyd Andrew W., Bowers R.W.J., Advances in Biocompatibility: Assessing Intraocular Materials, *Refractive Eyecare for Ophthalmologists*
27. Tang Y., Lu J.R., Lewis A., Vick T., Water diffusion in biocompatible PC polymer films, *Adsorption to Interfaces*, **2000**
28. Lewis A.L., Hughes P.D. et al, Synthesis and characterisation of phosphorylcholine-based polymers useful for coating blood filtration devices, *Biomaterials*, **2000**
29. Lewis A., Phosphorylcholine-based polymers and their use in the prevention of biofouling, *Colloids and Surfaces B: Biointerfaces*
30. Lewis A.L., Stratford P.W., A versatile phosphorylcholine-based coating for enhancement of medical devices, *UKSB First Annual Conference*
31. Navaroo-Villoslada, F., Orellana, G., Moreno-Bondi, M.C., Vick, T., Driver, M., Hildebrand, G. & Liefeth, K., Fiber-optic luminescent sensors with composite oxygen-sensitive layers and anti-biofouling coatings, *Anal Chem*, **2001**
32. Willis S.L., Court J.L., Redman R.P., Wang J-H., Leppard S.W., O'Byrne V.J., Small S.A., Lewis A.L., Jones S.A. & Stratford P.W. , A novel phosphorylcholine-coated contact lens for extended wear use, *Biomaterials*, **2001**
33. Lewis, A.L., Coatings for medical device enhancement, *The Coatings Agenda Europe 2001*
34. Lewis A.L., Tolhurst L.A. & Stratford P.W., Analysis of a Phosphorylcholine-based Polymer Coating on a Coronary Stent Pre- and Post-Implantation, *Biomaterials*, **2002**
35. Lewis A.L., Driver M.J., Blending in with the Body, *J Chem Edu*, **2002**
36. Lewis A.L., Stratford P.W., Phosphorylcholine-Coated Stents, *Journal of Long-Term Effects of Medical Implants*

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Bacterial Adhesion

1. *Dropcova S., Bowers, R. W. J., Denyer S. P., Faragher R. G. A., Gard P. R., Hall B., Hanlon G. W., Jones S. A., Lloyd A. W., Mikhalovsky S. V., Olliff C. J., Riding M., and Rosen P. H.*, The Effects of Adsorbed Phosphorylcholine Based Biomimetic Copolymers on Bacterial Adhesion to Poly(methylmethacrylate) Intraocular Lens Material, *J Pharm Pharmacol*, **1995**
2. *Murphy E.F., Lu J.R. et al*, The reduced adsorption of proteins on biocompatible materials, *Adsorption to Interfaces*, **2000**
3. *Russell J.C.*, Bacteria, biofilms and devices: the possible protective role of phosphorylcholine materials, *J Endourology*, **2000**
4. *Berry, J.A., Biedlingmaier, J.F. & Whelan P.J.*, In vitro resistance to bacterial biofilm formation on coated fluoroplastic tympanostomy tubes, *Otolaryngol. Head Neck Surg.*
5. *Andrews, C.S., Denyer, S.P., Hall, B., Hanlon, G.W., Lloyd, A.W.*, A comparison of the use of an ATP-based bioluminescent assay and image analysis for the assessment of bacterial adhesion to standard HEMA and biomimetic soft contact lenses, *Biomaterials*, **2001**
6. *West S.L., Salvage J.P., Lloyd A.W., Hanlon G.W., Lobb E.J., Armes S.P., Billingham N.C., Lewis A.L.*, A Comparison of Crosslinkable Sulfobetaine and Phosphobetaine Co-polymers as Potential Anti-bioadherent Coatings, *J Pharm Pharmacol*, **2002**
7. *West S.L., Salvage J. P., Lloyd A.W., Hanlon G.W., Lobb E.J., Armes S.P., Billingham N.C., Lewis A.L.*, Betaine Siloxanes as Potential Anti-bioadherent Coatings, *J Pharm Pharmacol*, **2002**

Interaction with Cells

1. *Long S.F., Lewis A.L., Hanlon G.W. & Lloyd A.W.*, Differential cell adhesion to phosphorylcholine polymers with varying cationic charge, *Eur Cells Materials*, **2001**

Haemocompatibility

1. *Hayward J.A., Chapman D.*, Biomembrane Surfaces as Models for Polymer Design: The Potential for Haemocompatibility, *Biomaterials*, **1984**
2. *Dennis E. Chenoweth*, Complement Activation Produced By Biomaterials, *Trans Am Soc Artif Intern Organs*
3. *Bird R.R., Hall B., Chapman D., Hobbs K.E.F.*, Material Thrombelastography: An Assessment of Phosphorylcholine Compounds as Models for Biomaterials, *Thrombosis Research*, **1988**
4. *R. le R. Bird B. Hall K. E. F. Hobbs and D. Chapman.*, New Haemocompatible Polymers Assessed by Thrombelastography, *J Biomed Eng*, **1989**
5. *Hall B., Bird R.R., Chapman D.*, Phospholipid Polymers & New Haemocompatible Materials, *Die Angewandte Makromolekulare Chemie*
6. *Campbell E.J., Hall B. et al*, Improved Haemocompatibility of Artificial Surfaces by Treatment Using Phosphorylcholine Derivatives, *Thromb Haemost*, **1993**
7. *Groth Th., Klosz, K., Campbell, E.J., New R.R.C., Hall, B., Goering, H.*, Protein Adsorption, Lymphocyte Adhesion and Platelet Adhesion/Activation on Polyurethane Ureas is Related to Hard Segment Content and Composition, *J Biomater Sci Polymer Edn*

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8. Chronos N., Campbell E.J. et al, Improved haemocompatibility of artificial surfaces can be achieved by phosphorylcholine coating: a human ex vivo flowing blood model, *Eur Heart J*, **1994**
9. Campbell E.J., Chronos N.A.F. et al, Non-thrombogenic phosphorylcholine coatings for stainless steel, *21st Ann. meeting of the Society for Biomaterials*
10. Murphy Emma F., Lu Jian R., The reduced adsorption of proteins on biocompatible materials, *Adsorption to Interfaces*, **2000**
11. Lewis A.L., Freeman R.T., Grey D., Hughes L., Redman R.P., Tolhurst L.A., Vick T., Wettable phosphorylcholine-based polymers useful in blood filtration, *UKSB First Annual Conference*
12. Lu, J.R., Murphy, E.F., Su, T.J., Lewis, A.L., Stratford, P.W. & Satija, S.K., Reduced protein adsorption on the surface of a chemically grafted phospholipid monolayer, *Langmuir, ACS Journal of Surfaces and Colloids*
13. Lewis, A.L., Freeman, R.N.T., Redman, R.P., Tolhurst, L.A., Kirkwood, L.C., Grey, D.M., Vick, T.A., Wettable phosphorylcholinecontaining polymers useful in blood filtration, *J Mater Sci: Mater Med*, **2003**

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