

Publications of Richard Mark Bradley

117. J. Li, G. Yang, R. M. Bradley, Y. Liu, F. Frost, Y. Hong, “Enhancing the quality of self-organized nanoripples by Ar-ion bombardment of a bilayer system,” *Nanotechnology* **32**, 385301 (2021).
116. R. M. Bradley and G. Hobler, “Second order corrections to the sputter yield of a curved surface,” *J. Appl. Phys.* **129**, 194301 (2021).
115. R. M. Bradley and T. Sharath, “Theory of Nanoscale Surface Ripple Formation During Oblique-Incidence Thin-Film Deposition,” *J. Appl. Phys.* **129**, 175303 (2021). **(Selected as an Editor’s Pick.)**
114. R. M. Bradley and T. Sharath, “Nanoscale Pattern Formation on Solid Surfaces Bombarded by Two Broad Ion Beams in the Regime in which Sputtering is Negligible,” *Phys. Rev. E* **103**, 022804 (2021).
113. D. Erb, R. de Schultz, A. Ilinov, K. Nordlund, R. M. Bradley and S. Facsco, “Nanopatterning of the (001) Surface of Crystalline Ge by Ion Irradiation at Off-Normal Incidence: Experiment and Simulation,” *Phys. Rev. B* **102**, 165422 (2020).
112. K. M. Loew and R. M. Bradley, “Parameter Estimation for Pattern Formation Induced by Ion Bombardment of Solid Surfaces Using Deep Learning,” *J. Phys.: Condens. Matter* **33**, 025901 (2020).
111. R. M. Bradley, “Theory of Nanoscale Ripple Topographies Produced by Ion Bombardment Near the Threshold for Pattern Formation,” *Phys. Rev. E* **102**, 012807 (2020).
110. K. M. Loew and R. M. Bradley, “The Effect of Dispersion on the Nanoscale Patterns Produced by Ion Sputtering,” *Phys. Rev. E* **100**, 012801 (2019).
109. F. C. Motta, R. Neville, P. D. Shipman, D. A. Pearson, and R. M. Bradley, “Measures of Order for Nearly Hexagonal Lattices,” *Physica D* **380 - 381**, 17 (2018).
108. H. M. Urbassek, M. L. Nietiadi, R. M. Bradley and G. Hobler, “Sputtering of $\text{Si}_c\text{Ge}_{1-c}$ Nanospheres,” *Phys. Rev. B* **97**, 155408 (2018).
107. M. P. Harrison, D. A. Pearson, and R. M. Bradley, “Emergence and Detailed Structure of Terraced Surfaces Produced by Oblique-Incidence Ion Sputtering,” *Phys. Rev. E* **96**, 032804 (2017).
106. M. P. Harrison and R. M. Bradley, “Fabrication of High Quality Multilayer Blazed Diffraction Gratings Using Ion Beam Assisted Deposition,” *J. Appl. Phys.* **121**, 225304 (2017).
105. M. P. Harrison and R. M. Bradley, “Blazed Diffraction Gratings Produced by Ion Bombardment of Pre-patterned Solid Surfaces,” *J. Appl. Phys.* **121**, 054308 (2017).
104. R. M. Bradley and H. Hofsäss, “Nanoscale Patterns Produced by Self-Sputtering of Solid Surfaces: The Effect of Ion Implantation,” *J. Appl. Phys.* **120**, 074302 (2016).

103. G. Hobler, M. L. Nietiadi, R. M. Bradley and H. M. Urbassek, "Sputtering of Silicon Membranes with Nanoscale Thickness," *J. Appl. Phys.* **119**, 245105 (2016).
102. G. Hobler, R. M. Bradley and H. M. Urbassek, "Probing the Limitations of Sigmund's Model of Spatially Resolved Sputtering Using Monte Carlo Simulations," *Phys. Rev. B* **93**, 205443 (2016).
101. T. Basu, D. A. Pearson, R. M. Bradley and T. Som, "Temporal Evolution of a Silicon Surface Subject to Low Energy Ion Irradiation and Concurrent Substrate Rotation," *Appl. Surf. Sci.* **379**, 480 (2016).
100. M. P. Harrison and R. M. Bradley, "Producing Virtually Defect-Free Nanoscale Ripples by Ion Bombardment of Periodically Rocked Surfaces," *Phys. Rev. E (Rapid Communications)* **93**, 040802 (2016).
99. R. M. Bradley, "Morphological Transitions in Nanoscale Patterns Produced by Concurrent Ion Sputtering and Impurity Co-deposition," *J. Appl. Phys.* **119**, 134305 (2016).
98. B. Hashmi, P. D. Shipman and R. M. Bradley, "Highly Ordered Square Arrays of Nanoscale Pyramids Produced by Ion Bombardment of a Crystalline Binary Material," *Phys. Rev. E* **93**, 032207 (2016).
97. D. A. Pearson, R. M. Bradley, F. C. Motta and P. D. Shipman, "Patterning Surfaces Before Ion Sputtering Can Yield Nanodot Arrays with Improved Hexagonal Order," *Phys. Rev. E* **92**, 062401 (2015).
96. M. P. Harrison and R. M. Bradley, "Nanoscale Patterns Formed by Ion Bombardment of Rotating Binary Materials," *J. Phys.: Cond. Matt.* **27**, 295301 (2015).
95. H. Hofsäss and R. M. Bradley, "Tests of the Modified Sigmund Model of Ion Sputtering using Monte Carlo Simulations," *J. Appl. Phys.* **117**, 174310 (2015).
94. H. M. Urbassek, R. M. Bradley, M. L. Nietiadi and W. Möller, "Sputter Yield of Curved Surfaces," *Phys. Rev. B* **91**, 165418 (2015).
93. D. A. Pearson and R. M. Bradley, "Theory of Terraced Topographies Produced by Oblique-Incidence Ion Bombardment of Solid Surfaces," *J. Phys.: Cond. Matt.* **27**, 015010 (2015).
92. M. P. Gelfand and R. M. Bradley, "One Dimensional Conservative Surface Dynamics with Broken Parity: Arrested Collapse versus Coarsening," *Phys. Lett. A* **379**, 199 (2015).
91. R. M. Bradley and H. Hofsäss, "A Modification to the Sigmund Model of Ion Sputtering," *J. Appl. Phys.* **116**, 234304 (2014).
90. F. C. Motta, P. D. Shipman and R. M. Bradley, "Theory of Nanoscale Pattern Formation Produced by Oblique-Incidence Ion Bombardment of Binary Compounds," *Phys. Rev. B* **90**, 085428 (2014).
89. M. P. Harrison and R. M. Bradley, "The Crater Function Approach to Ion-Induced Nanoscale Pattern Formation: Craters for Flat Surfaces are Insufficient," *Phys. Rev. B* **89**,

- 245401 (2014).
88. S. A. Mollick, D. Ghose, P. D. Shipman and R. M. Bradley, "Anomalous Patterns and Nearly Defect-Free Ripples Produced by Bombarding Silicon and Germanium with a Beam of Gold Ions," *Appl. Phys. Lett.* **104**, 043103 (2014).
 87. R. M. Bradley, "Nanoscale Compositional Banding in Binary Thin Films Produced by Ion-Assisted Deposition," *J. Appl. Phys.* **114**, 224306 (2013).
 86. R. M. Bradley and K. W. Mauser, "Can the Atomic Yields Oscillate during Ion Sputtering of an Initially Homogeneous Multicomponent Alloy?," *J. Appl. Phys.* **114**, 033506 (2013).
 85. R. M. Bradley, "Nanoscale Patterns Produced by Ion Erosion of a Solid with Co-deposition of Impurities: The Crucial Effect of Compound Formation," *Phys. Rev. B* **87**, 205408 (2013).
 84. M. P. Gelfand and R. M. Bradley, "Highly Ordered Nanoscale Patterns Produced by Masked Ion Bombardment of a Moving Solid Surface," *Phys. Rev. B (Rapid Communications)* **86**, 121406 (2012).
 83. R. M. Bradley, "Surface Instability of Binary Compounds Caused by Sputter Yield Amplification," *J. Appl. Phys.* **111**, 114305 (2012).
 82. R. M. Bradley, "Producing Ripple Topographies by Ion Bombardment with Co-Deposition of Impurities: A Curvature Dependent Sputter Yield Is Not Required," *Phys. Rev. B* **85**, 115419 (2012).
 81. F. C. Motta, P. D. Shipman and R. M. Bradley, "Highly Ordered Nanoscale Surface Ripples Produced by Ion Bombardment of Binary Compounds," *J. Phys. D (Fast Track Communications)* **45**, 122001 (2012).
 80. R. M. Bradley and P. D. Shipman, "A Surface Layer of Altered Composition Can Play a Key Role in Nanoscale Pattern Formation Induced By Ion Bombardment," *Appl. Surf. Sci.* **258**, 4161 (2012).
 79. P. D. Shipman and R. M. Bradley, "Theory of Nanoscale Pattern Formation Induced by Normal-Incidence Ion Bombardment of Binary Compounds," *Phys. Rev. B* **84**, 085420 (2011).
 78. R. M. Bradley, "Exact Linear Dispersion Relation for the Sigmund Model of Ion Sputtering," *Phys. Rev. B* **84**, 075413 (2011).
 77. R. M. Bradley, "Theory of Nanodot and Sputter Cone Arrays Produced by Ion Sputtering with Concurrent Deposition of Impurities," *Phys. Rev. B* **83**, 195410 (2011).
 76. R. M. Bradley, "Redeposition of Sputtered Material is a Nonlinear Effect," *Phys. Rev. B* **83**, 075404 (2011).
 75. R. M. Bradley and P. D. Shipman, "Spontaneous Pattern Formation Induced by Ion Bombardment of Binary Compounds," *Phys. Rev. Lett.* **105**, 145501 (2010).

74. R. M. Bradley, "Diffusion in a Two-Dimensional Channel with Curved Midline and Varying Width: Reduction to an Effective One-Dimensional Description," *Phys. Rev. B* **80**, 061142 (2009).
73. R. M. Bradley, "Shock Waves on Current-Carrying Metal Thin Films," *Phys. Rev. B* **79**, 075402 (2009).
72. R. M. Bradley, "Electromigration-Induced Shock Waves on Metal Thin Films," *Appl. Phys. Lett.* **93**, 213105 (2008).
71. R. M. Bradley, J. E. Bernard and L. D. Carr, "Exact Dynamics of Multi-Component Bose-Einstein Condensates in Optical Lattices in One, Two and Three Dimensions," *Phys. Rev. A* **77**, 033622 (2008).
70. R. M. Bradley, B. Deconinck and J. N. Kutz, "Exact Nonstationary Solutions to the Mean-Field Equations of Motion for Two-Component Bose-Einstein Condensates in Periodic Potentials," *J. Phys. A* **38**, 1901 (2005).
69. R. M. Bradley, "Electromigration-Induced Propagation of Nonlinear Surface Waves," *Phys. Rev. E* **65** 36603 (2002).
68. A. S. Özcan, K. F. Ludwig, Jr., C. Lavoie, C. Cabral, Jr., J. M. E. Harper, and R. M. Bradley, "Nucleation and Growth Kinetics of Preferred C54 TiSi₂ Orientations: Time-Resolved X-Ray Diffraction Measurements," *J. Appl. Phys.* **92**, 5189 (2002).
67. R. M. Bradley, "Transverse Instability of Solitons Propagating on Current-Carrying Metal Thin Films," *Physica D* **158**, 216 (2001).
66. R. M. Bradley, A. Eschmann, and S. A. Lee, "Theory of Feature Broadening in Direct-Write Optical Lithography," *J. Appl. Phys.* **88**, 3316 (2000).
65. R. M. Bradley, "Electromigration-Induced Soliton Propagation on Metal Surfaces," *Phys. Rev. E* **60**, 3736 (1999).
64. M. Mahadevan and R. M. Bradley, "Simulations and Theory of Electromigration-Induced Slit Formation in Unpassivated Single Crystal Metal Lines," *Phys. Rev. B* **59**, 11037 (1999).
63. M. Mahadevan and R. M. Bradley, "Phase Field Model of Surface Electromigration in Single Crystal Metal Thin Films," *Physica D* **126**, 201 (1999).
62. K. M. Crosby and R. M. Bradley, "Pattern Formation during Delamination and Buckling of Thin Films," *Phys. Rev. E (Rapid Communications)* **59**, R2542 (1999).
61. R. M. Bradley, M. Mahadevan, and K. Wu, "Exact Results on Void Growth in a Model of Electromigration," *Phil. Mag. B* **79**, 257 (1999).
60. M. Mahadevan, R. M. Bradley, and J.-M. Debierre, "Simulations of an Electromigration-Induced Edge Instability in Single Crystal Metal Lines," *Europhys. Lett.* **45**, 680 (1999).

59. R. M. Bradley and K. M. Crosby, "Pattern Formation in Thin Film Failure," *Phil. Mag. B* **78**, 143 (1998).
58. K. M. Crosby, R. M. Bradley, and H. Boularot, "Electromigration-Induced Void Drift and Coalescence: Simulations and a Dynamic Scaling Theory," *Phys. Rev. B* **56**, 8743 (1997).
57. K. M. Crosby and R. M. Bradley, "Mean Field Theory of Athermal Martensite Growth," *Phil. Mag. Lett.* **75**, 131 (1997).
56. K. M. Crosby and R. M. Bradley, "Fragmentation of Thin Films Bonded to Solid Substates: Simulations and a Mean-Field Theory," *Phys. Rev. E* **55**, 6084 (1997).
55. K. M. Crosby and R. M. Bradley, "Simulations of Tensile Fracture in Thin Films Bonded to Solid Substrates," *Phil. Mag. B* **76**, 91 (1997).
54. R. M. Bradley, "Dynamic Scaling of Ion-Sputtered Rotating Surfaces," *Phys. Rev. E* **54**, 6149 (1996).
53. H. Boularot and R. M. Bradley, "Mean-Field Theory of Electromigration-Induced Void Drift and Coalescence in Metal Thin Films," *J. Appl. Phys.* **80**, 756 (1996).
52. M. Mahadevan and R. M. Bradley, "Stability of a Circular Void in an Passivated, Current-Carrying Metal Film," *J. Appl. Phys.* **79**, 6840 (1996).
51. R. M. Bradley and E.-H. Cirlin, "Theory of Improved Resolution in Depth Profiling with Sample Rotation," *Appl. Phys. Lett.* **68**, 3722 (1996).
50. J.-M. Debierre and R. M. Bradley, "Numerical Estimate of a Scaling Exponent Characterizing Fluctuating Diffusion Fronts," *Phys. Rev. E* **53**, 1238 (1996).
49. J.-M. Debierre and R. M. Bradley, "Fragmentation of Percolation Cluster Perimeters," *J. Phys. A* **29**, 2337 (1996).
48. K. Wu and R. M. Bradley, "Theory of Electromigration Failure in Polycrystalline Metal Films," *Phys. Rev. B* **50**, 12468 (1994).
47. J.-M. Debierre and R. M. Bradley, "Front Propagation in a Random Medium with a Power-Law Distribution of Transit Times," *Phys. Rev. E* **50**, 2467 (1994).
46. R. M. Bradley and K. Wu, "A Dynamic Fuse Model for Electromigration Failure of Polycrystalline Metal Films," *Phys. Rev. E (Rapid Communications)* **50**, R631 (1994).
45. B. J. Buchalter and R. M. Bradley, "Orientational Order in Amorphous Packings of Ellipsoids," *Europhys. Lett* **26**, 159 (1994).
44. K. Wu and R. M. Bradley, "An Efficient Green's Function Approach to Finding the Currents in a Random Resistor Network," *Phys. Rev. E* **49**, 1712 (1994).
43. R. M. Bradley and K. Wu, "Crack Propagation in a Dynamic Fuse Model of Electromigration," *J. Phys. A* **27**, 327 (1994).
42. R. M. Bradley, "Two Stage Collapse of a Polymer Chain in Two Dimensions," *Phys. Rev. E (Rapid Communications)* **48**, R4195 (1993).

41. R. M. Bradley, "Mapping Between a Self-Attracting Self-Avoiding Surface and a Percolation Hull in Three Dimensions," *Phys. Rev. E* **49**, 1909 (1994).
40. J.-M. Debierre and R. M. Bradley, "A Reexamination of Diffusion-Limited Aggregation with a Finite Lifetime," *J. Phys. A* **25**, 6551 (1992).
39. B. J. Buchalter and R. M. Bradley, "Orientational Order in Random Packings of Ellipses," *Phys. Rev. A* **46**, 3046 (1992).
38. B. J. Buchalter and R. M. Bradley, "Orientational Order in Amorphous Packings of Ellipses," *J. Phys. A Letters* **25**, L1219 (1992).
37. R. M. Bradley, "Conductivity Exponent for Antipercolation on the Bethe Lattice," *Phil. Mag. B* **66**, 463 (1992).
36. R. M. Bradley, P. N. Strenski, and J.-M. Debierre, "A Growing Self-Avoiding Walk in Three Dimensions and Its Relation to Percolation," *Phys. Rev. A* **45**, 8513 (1992).
35. R. M. Bradley, "Highlights of the Round Table Discussion on Polymers at High Pressure," in the Proceedings of the NATO Advanced Workshop "Frontiers of High Pressure Research," edited by H. D. Hochheimer and R. D. Etters (Plenum, New York, 1992), page 97.
34. R. M. Bradley, J.-M. Debierre, and P. N. Strenski, "A Novel Growing Self-Avoiding Walk in Three Dimensions," *J. Phys. A Letters* **25**, L541 (1992).
33. R. M. Bradley, J.-M. Debierre, and P. N. Strenski, "Anomalous Scaling Behavior in Percolation with Three Colors," *Phys. Rev. Lett.* **68**, 2332 (1992).
32. J.-M. Debierre and R. M. Bradley, "Scaling Properties of Antipercolation Hulls on the Triangular Lattice," *J. Phys. A* **25**, 335 (1992).
31. K. Wu and R. M. Bradley, "Oscillatory Phenomena in Kinetic Antipercolation," *Phys. Rev. A* **45**, 1255 (1992).
30. R. M. Bradley, P. N. Strenski, and J.-M. Debierre, "Surfaces of Percolation Clusters in Three Dimensions," *Phys. Rev. B* **44**, 76 (1991).
29. K. Wu and R. M. Bradley, "A Percolation Model for the Spread of Venereal Epidemics. I. Mean Field Theory," *J. Phys. A* **24**, 2569 (1991).
28. P. N. Strenski, R. M. Bradley, and J.-M. Debierre, "Fractal Geometry of Percolation Surfaces in Three Dimensions," *Phys. Rev. Lett.* **66**, 1330 (1991).
27. K. Wu and R. M. Bradley, "Real Space Renormalization Group Study of Self-Attracting Self-Avoiding Walks and Trails," *Phys. Rev. A* **41**, 6845 (1990).
26. R. M. Bradley, "Exact Theta Point and Exponents for Two Models of Polymer Chains in Two Dimensions", *Phys. Rev. A* **41**, 914 (1990).
25. R. M. Bradley and P. N. Strenski, "Nucleation and Growth with Two Stable Phases", *Phys. Rev. B* **40**, 8967 (1989).

24. J. M. E. Harper, S. E. Hornstrom, P. J. Rudeck, and R. M. Bradley, "Angle of Incidence Effects in Ion Beam Processing", Proc. Mat. Res. Soc. **128**, 269 (1989).
23. R. M. Bradley, "Exact Theta Point and Exponents for Polymer Chains on the Manhattan Lattice", Phys. Rev. A (Rapid Communications) **39**, 3738 (1989).
22. J. M. Debierre and R. M. Bradley, "Growing Self-Avoiding Surfaces", J. Phys. A Letters **22**, L213 (1989).
21. R. M. Bradley, "Analytical Enumeration of Hamiltonian Walks on a Fractal", J. Phys. A Letters **22**, L19 (1989).
20. R. M. Bradley and J. M. E. Harper, "Reply to 'The Production of Surface Features by Sputtering and Related Processes' ", Defect and Diffusion Forum **61**, 55 (1988).
19. R. M. Bradley, D. Kung, S. Doniach and P. N. Strenski, "Finite-Voltage Behavior of Highly Disordered Granular Superconductors", Physica B **152**, 282 (1988).
18. R. M. Bradley, "Thin Film Modification by Off-Normal Incidence Ion Bombardment", in "Handbook of Ion Beam Processing Technology", edited by J. J. Cuomo, S. M. Rossnagel and H. R. Kaufman (Noyes, Park Ridge, 1989), Chap. 15.
17. R. M. Bradley and J. M. E. Harper, "Theory of Ripple Topography Induced by Ion Bombardment", J. Vac. Sci. Technol. A **6**, 2390 (1988).
16. R. M. Bradley, D. Kung, S. Doniach and P. N. Strenski, "Nonlinear Conductivity of Granular Superconductors: A Novel Breakdown Problem", J. Phys. A Letters **20**, L911 (1987).
15. R. M. Bradley, "Exact Solution of a Kinetic Self-Avoiding Walk on a Fractal", J. Phys. A Letters **20**, L821 (1987).
14. R. M. Bradley, D. Kung, J. M. Debierre and L. Turban, "Comment on 'Reflecting and Absorbing Boundary Conditions on the Tail of the Laplacian Random Walk'", J. Phys. A. **20**, 3547 (1987).
13. R. M. Bradley, J. M. E. Harper and D. A. Smith, "Theory of Thin Film Orientation by Ion Bombardment during Deposition", J. Vac. Sci. Technol. A. **5**, 1792 (1987).
12. R. M. Bradley, "Comment on 'Ring Dynamics and Percolation in an Excitable Medium'", J. Chem. Phys. **86**, 7245 (1987).
11. R. M. Bradley, "Theory of High-Temperature Oxide Decomposition at the SiO₂/Si Interface", J. Appl. Phys. **61**, 545 (1987).
10. R. M. Bradley, J. M. E. Harper and D. A. Smith, "Theory of Thin Film Orientation by Ion Bombardment during Deposition", J. Appl. Phys. **60**, 4160 (1986).
9. R. M. Bradley, "Origin of Thickness Oscillations in Nucleated Thin-Film Silicides", J. Appl. Phys. **60**, 3146 (1986).
8. J. P. Nadal, R. M. Bradley and P. N. Strenski, "Crossover between Invasion Percolation and the Eden Model in One Dimension", J. Phys. A. Letters **19**, L505 (1986).

7. R. M. Bradley and D. Kung, "Diffusion-Limited Growth of Polymer Chains", Phys. Rev. A (Rapid Communications) **34**, 723 (1986).
6. R. M. Bradley, "Statistical Mechanics of the Travelling Salesman on the Sierpinski Gasket", J. de Physique **47**, 9 (1986).
5. P. N. Strenski and R. M. Bradley, "General Bond-to-Site Mapping in Aggregation", J. Phys. A Letters **18**, L195 (1985).
4. R. M. Bradley and P. N. Strenski, "Directed Aggregation on the Bethe Lattice: Scaling, Universality and Mappings", Phys. Rev. B **31**, 4319 (1985).
3. R. M. Bradley and P. N. Strenski, "Directed Diffusion-Limited Aggregation on the Bethe Lattice: Exact Results", Phys. Rev. B (Rapid Communications) **30**, 6788 (1984).
2. R. M. Bradley and S. Doniach, "Quantum Fluctuations in Chains of Josephson Junctions", Phys. Rev. B **30**, 1138 (1984).
1. R. M. Bradley and S. Doniach, "Quantum Tunneling in One-Dimensional Superconducting Systems", J. de Physique (Colloques) **44**, C3-919 (1983).