

CONTENTS TO PART B

Section 9. Breeder materials

9.1. <i>Recent advances in the development of solid breeder blanket materials</i> , C.E. Johnson and G.W. Hollenberg	871
9.2. <i>Measurement of retained helium and tritium in irradiated lithium ceramics</i> , D.L. Baldwin	882
9.3. <i>Tritium recovery from lithium oxide pellets</i> , P.C. Bertone and D.L. Jassby	884
9.4. <i>The TRIO-01 experiment: in-situ tritium recovery results</i> , R.G. Clemmer, P.A. Finn, M.C. Billone, B. Misra, R.M. Arons, R.B. Poepfel, F.F. Dyer, I.T. Dudley, L.C. Bate, E.D. Clemmer, J.L. Scott, J.S. Watson and P.W. Fisher	890
9.5. <i>Fast neutron irradiation results on Li_2O, Li_4SiO_4, Li_2ZrO_3 and $LiAlO_2$</i> , G.W. Hollenberg	896
9.6. <i>The solubility of deuterium in solid Li_2O</i> , H.R. Ihle and C.H. Wu	901
9.7. <i>In-situ tritium recovery experiment from lithium oxide under high neutron fluence</i> , T. Kurasawa, H. Takeshita, H. Watanabe, H. Yoshida, Y. Naruse, T. Miyauchi, K. Mimura and H. Umei	902
9.8. <i>Extraction of tritium from impure lithium by yttrium: a thermochemical treatment of the problem</i> , H. Migge	903
9.9. <i>Irradiation effects of lithium oxide</i> , K. Noda, T. Tanifuji, Y. Ishii, H. Matsui, N. Masaki, S. Nasu and H. Watanabe	908
9.10. <i>Measurements of the activity coefficient of $LiOH$ dissolved in $Li_2O(s)$ for an evaluation of Li_2O as a tritium breeder material</i> , J.H. Norman and G.R. Hightower	913
9.11. <i>Aspects of tritium release from neutron-irradiated lithium oxide</i> , K.R. O'Kula and W.F. Vogelsang	921
9.12. <i>Neutron irradiation and compatibility testing of Li_2O</i> , D.L. Porter, J.R. Krsul, M.T. Laug, L.C. Walters and M. Tetenbaum	929
9.13. <i>Water adsorption on lithium oxide pellets in helium sweep gas stream</i> , H. Yoshida, S. Konishi, H. Takeshita, T. Kurasawa, H. Watanabe and Y. Naruse	934
9.14. <i>A thermodynamic investigation of dilute solutions of hydrogen in liquid $Li-Pb$ alloys</i> , Y.C. Chan and E. Veleckis	935
9.15. <i>The interaction of hydrogen isotopes with lithium-lead alloys</i> , C.H. Wu	941

Section 10. Materials testing for fusion

10.1. <i>Issues in strategy for an irradiation program on fusion structural materials</i> , R.E. Nygren	949
10.2. <i>The fusion materials irradiation test (FMIT) facility</i> , J.W. Hagan, E.K. Opperman and A.L. Trego	958
10.3. <i>TASKA-M, a compact fusion technology test facility</i> , G.L. Kulcinski, G.A. Emmert, J.F. Santarius, M.L. Corradini, L. El-Guebaly, E.M. Larsen, C.W. Maynard, L.J. Perkins, R.R. Peterson, K. Plute, M.E. Sawan, J.E. Scharer, I.N. Sviatoslavsky, D.K. Sze, W.F. Vogelsang, L. Wittenberg, P. Komarek, W. Heinz, W. Maurer, F. Arendt, A. Suppan, M. Kuntz, S. Malang, R. Klingelhofer, G. Neffe and K. Kleefeldt	965
10.4. <i>Induced radioactivity of component materials by 16-MeV protons and 30-MeV alpha particles</i> , K. Abe, A. Iizuka, A. Hasegawa and S. Morozumi	972
10.5. <i>Disposal of activated fusion wall materials</i> , J.A. Blink, D.W. Dorn and R.C. Maninger	977
10.6. <i>Comparison of transmutation and activation effects in five ferritic alloys and AISI 316 stainless steel in a fusion neutron spectrum</i> , G.J. Butterworth and O.N. Jarvis	982
10.7. <i>Characterization of the radiation environment at a new proposed irradiation facility at LAMPF</i> , D.R. Davidson, W.F. Sommer, J.N. Bradbury, R.E. Prael and R.C. Little	989
10.8. <i>Confirmation of the one-interstitial model for α-iron from positron annihilation experiments in thermal equilibrium on pure and carbon doped samples</i> , L. De Schepper, L.M. Stals, D. Segers, L. Dorikens-Vanpraet, M. Dorikens, G. Knuyt and P. Moser	995

Contents to Part B

10.9. <i>A study of defects produced in tungsten by 800-MeV protons using field ion microscopy</i> , D.J. Farnum, W.F. Sommer and O.T. Inal	996
10.10 <i>A comparison of measured and calculated helium production in nickel using newly evaluated neutron cross sections for ^{59}Ni</i> , L.R. Greenwood, D.W. Kneff, R.P. Skowronski and F.M. Mann	1002
10.11. <i>Recent developments in neutron dosimetry and radiation damage calculations for fusion materials studies</i> , L.R. Greenwood	1011
10.12. <i>Damage production and recovery in zirconium irradiated with fusion neutrons</i> , M.W. Guinan and R.H. Zee	1017
10.13 <i>Neutron cross sections for defect production by high energy displacement cascades in copper</i> , H.L. Heinisch and F.M. Mann	1023
10.14. <i>Defect production efficiencies in thermal neutron irradiated copper and molybdenum</i> , J.H. Kinney, M.W. Guinan and Z.A. Munir	1028
10.15. <i>Materials investigations for the target of the German spallation neutron source and their relations to fusion reactor materials research</i> , W. Lohmann and K.-H. Graf	1033
10.16. <i>Point defect production and annihilation in neutron-irradiated zirconium</i> , S.R. MacEwen, R.H. Zee, R.C. Birtcher and C. Abromeit	1036
10.17. <i>Radiation damage calculations with NJOY</i> , R.E. MacFarlane, D.W. Muir and F.M. Mann	1041
10.18. <i>Advanced nuclear data for radiation damage calculations</i> , R.E. MacFarlane and D.G. Foster, Jr.	1047
10.19. <i>Reduced activation calculations for the Starfire first wall</i> , F.M. Mann	1053
10.20. <i>Improved activation cross sections for vanadium and titanium</i> , D.W. Muir and E.D. Arthur	1058
10.21. <i>Progress in FMIT test assembly development</i> , E.K. Opperman, M.A. Vogel, E.J. Shen and A.L. Trego	1065
10.22. <i>Measurement of the $^{17}\text{Al}(n, 2n)^{26}\text{Al}$ reaction cross section for fusion reactor applications</i> , R.K. Smither and L.R. Greenwood	1071
10.23. <i>Spallation radiation damage and the radiation damage facility at the LAMPF A-6 target station</i> , M.S. Wechsler and W.F. Sommer	1078
 Section 11. Fusion device testing	
11.1. <i>TFTR materials issues and problems during design and construction</i> , M. Sabado and R. Little	1087
11.2. <i>The materials aspects of the JT-60 device</i> , R.R. Hasiguti and K. Tomabechi	1099
11.3. <i>Materials and design aspects of the RiggatronTM tokamak</i> , S.N. Rosenwasser, R.D. Stevenson, G. Listvinsky, D.L. Vrable, J.E. McGregor and N. Nir	1107
11.4. <i>Materials used in modification of Doublet III for a large D-shaped vacuum vessel</i> , F. Puhn	1121
11.5. <i>TEXTOR: research programme on plasma wall interaction</i> , G.H. Wolf	1124
11.6. <i>Surface area measurements of the first-wall in the Tandem mirror experiment-upgrade (TMX-U)</i> , R. Bastasz, W.L. Hsu and S.A. Allen	1136
11.7. <i>An experimental study of the thermal performance of refractory coatings exposed to a tokamak plasma</i> , M.L. Brown, L. Keller, C. Deshpandey, R.F. Bunshah, V.K. Dhir and R.J. Taylor	1140
11.8. <i>Surface composition changes in Inconel 625 during RG and ECR discharge cleaning of TEXTOR at 300°C</i> , R.E. Clausing, K.G. Tschersich, H.P. Fleischhauer, L. Heatherly, F. Waelbroeck, J. Winter, P. Wienhold, Y. Sakamoto, S. Ishii and K. Yano	1145
11.9. <i>Preliminary investigations of the surface chemistry of titanium gettering</i> , J.R. Elliott, R.S. Williams, L. Keller and R.J. Taylor	1151
11.10. <i>Experience with Zr-Al getter pumps in the ISX-B tokamak</i> , L.C. Emerson, P.K. Mioduszewski and J.E. Simpkins	1156
11.11. <i>Surface analysis of TiC limiter exposed in JIPP T-II stellarator / tokamak hybrid device</i> , Y. Hirohata, S. Adachi, S. Fukuda, M. Mohri, T. Yamashina, N. Noda, S. Tanahashi, J. Fujita and Y. Gomya	1160
11.12. <i>Experience with C + SiC alloy coated armor / limiter tiles in Doublet III</i> , G.R. Hopkins, P.W. Trester and J.L. Kaae	1165
11.13. <i>A study of limiter damage in a magnetic field error region of the ZT-40M experiment</i> , H. Makowitz	1170
11.14. <i>Energy deposition on the walls of the ohmically and neutral-beam-heated ASDEX tokamak</i> , E.R. Müller and the ASDEX Team, presented by R. Behrisch	1175

Contents to Part B

11.15. <i>Improved performance of TiC-coated graphite limiters by surface texturing</i> , J.B. Whitley, D.M. Mattox, P.W. Trester and L.C. Emerson	1177
11.16. <i>In-situ measurement of the hydrogen recycling constant of the TEXTOR liner</i> , P. Wienhold, F. Waelbroeck, J. Winter, E. Rota, T. Banno and R. Yamada	1180
11.17. <i>Surface conditioning of liners and limiters of TEXTOR by plasmachemical carbon deposition</i> , J. Winter, F. Waelbroeck, P. Wienhold, H.G. Esser, L. Könen, T. Banno, E. Rota and R.E. Clausing	1187
11.18. <i>Impurity measurements in the TEXTOR plasma edge using deposition probe techniques</i> , R.A. Zuhr	1193
Section 12. Corrosion and compatibility	
12.1. <i>Compatibility of materials for use in liquid-metal blankets of fusion reactors</i> , O.K. Chopra and P.F. Tortorelli	1201
12.2. <i>Influence of a flowing lithium environment on the fatigue and tensile properties of type 316 stainless steel</i> , O. Chopra and D. Smith	1213
12.3. <i>Corrosion of ferrous alloys in eutectic lead–lithium environment</i> , O. Chopra and D. Smith	1219
12.4. <i>Chemical reactions between ICF pellet debris and tantalum</i> , C. Hirayama	1225
12.5. <i>Silicon behaviour in liquid lithium systems</i> , P. Hubberstey and A.T. Dadd	1231
12.6. <i>Activation product transport in fusion reactors</i> , A.C. Klein and W.F. Vogelsang	1236
12.7. <i>LILO-1 – A thermoconvection loop for studying the behavior of stainless steel exposed to liquid lithium</i> , H.R. Konvicka and P.R. Sattler	1241
12.8. <i>Chemical compatibility between lithium oxide and transition metals</i> , R.J. Pulham, W.R. Watson and J.S. Collison	1243
12.9. <i>Phase stability and corrosion of Cr–Mn austenitic steels exposed to pure lithium</i> , E. Ruedl, V. Coen, T. Sasaki and H. Kolbe	1247
12.10. <i>Compatibility of fusion reactor materials with flowing lithium</i> , K. Shibata, K. Suzuki, Y. Narita and C. Yamanaka	1252
12.11. <i>Mass transfer behavior of a modified austenitic stainless steel in lithium</i> , P.F. Tortorelli and J.H. DeVan	1258
12.12. <i>Surface analysis of ferrous alloys exposed to static Pb–17 at % Li</i> , P.F. Tortorelli and J.H. DeVan	1264
Section 13. Coatings and claddings	
13.1. <i>Properties of deposited materials – Possible relationship to “redeposited” materials</i> , D.M. Mattox	1267
13.2. <i>Void formation at TiC-316 stainless steel interface by diffusion annealing</i> , A. Ohkawa, R.R. Hasiguti and H. Yumoto	1276
13.3. <i>Properties of TiC co-deposited with Ar gas</i> , T. Shikama, M. Fukutomi, M. Fujitsuka and M. Okada	1281
13.4. <i>Brazing of bulk graphite / solid tritium breeder materials to metal substrates</i> , D.J. Suiter, D.A. Bowers, G.D. Morgan, C.A. Trachsel and G.W. Wille	1286
13.5. <i>Deuterium permeation through oxidized Fe–Cr-alloy</i> , W.A. Swansiger, B.E. Mills and A.S. Nagelberg	1292
13.6. <i>Process evaluation and characterization of a C + SiC alloy coating on graphite tiles for Doublet III armor / limiters</i> , P.W. Trester, G.R. Hopkins and J.L. Kaae	1298
13.7. <i>Thermal cycling test of TiC-graphite</i> , S. Yamanaka, H. Ohara, P. Son and M. Miyake	1304
13.8. <i>Residual stress in coated low-Z films of TiC and TiN: I. Stress measurement by use of X-ray diffractometry</i> , I. Yoshizawa and K. Kamada	1309
13.9. <i>Residual stress in coated low-Z films of TiC and TiN: II. Correlation of residual stress with microstructure</i> , I. Yoshizawa, Z. Kabeya and K. Kamada	1315
13.10. <i>Residual stress in coated low-Z films of TiC and TiN: III. PVD coated films</i> , I. Yoshizawa, K. Fukutomi and K. Kamada	1320
Section 14. Electrical and magnetic materials	
14.1. <i>Organic materials for fusion reactor applications</i> , G.F. Hurley and R.R. Coltman, Jr.	1327

Contents to Part B

14.2. <i>Ceramic materials for fusion reactor applications</i> , G.P. Pells	1338
14.3. <i>High current contact material design constraints for tokamak devices</i> , D.C. Banker	1352
14.4. <i>A national low temperature neutron irradiation facility</i> , R.R. Coltman, Jr., C.E. Klabunde and F.W. Young, Jr.	1357
14.5. <i>Radiation-induced RF loss measurements and thermal stress calculations for ceramic windows</i> , J.D. Fowler, Jr.	1359
14.6. <i>Fusion neutron effects on magnetoresistivity of copper stabilizer materials</i> , M.W. Guinan and R.A. Van Konynenburg	1365
14.7. <i>Materials considerations for highly irradiated normal-conducting magnets in fusion reactor applications</i> , L.J. Perkins	1371
14.8. <i>Charts for specifying limits on copper stabilizer damage rate</i> , M.E. Sawan	1376
14.9. <i>Tests on irradiated magnet insulator materials</i> , R.E. Schmunk, L.G. Miller and H. Becker	1381
14.10. <i>Structural performance of ceramics in a high-fluence fusion environment</i> , F.W. Clinard, Jr., G.F. Hurley, L.W. Hobbs, D.L. Rohr and R.A. Youngman	1386
14.11. <i>A TEM study of heavy-ion irradiation damage in α-Al₂O₃ with and without helium doping</i> , W.E. Lee, G.P. Pells and M.L. Jenkins	1393
14.12. <i>High dose, high temperature radiation damage of helium-doped alumina in the HVEM</i> , G.P. Pells and T. Shikama	1398

Section 15. Plasma materials interactions

15.1. <i>Helium bubble behavior in long term aged 316 and 316 + Ti steels irradiated with helium ions</i> , T. Aruga, Y. Katano and K. Shiraishi	1401
15.2. <i>Chemical erosion of first wall materials by atomic hydrogen at high temperatures</i> , C.I.H. Ashby	1406
15.3. <i>Ion impact desorption measurements of sputter-deposited copper on stainless steel</i> , R. Bastasz, R.A. Kerst and R.A. Causey	1412
15.4. <i>Light ion sputtering of low Z materials in the temperature range 20–1100 °C</i> , J. Bohdanský and J. Roth	1417
15.5. <i>Sputtering properties of lithium-bearing copper alloys</i> , A.R. Krauss, D.M. Gruen and M. Venugopalan	1425
15.6. <i>Sputtering behavior of graphite and molybdenum at low bombarding energies</i> , E. Hechtl and J. Bohdanský	1431
15.7. <i>Investigation of vacuum arcs on graphite cathodes</i> , A.W. Koch, A.W. Nürnberg and R. Behrisch	1437
15.8. <i>A comparative study of the chemical erosion of different types of graphite and the influence of nickel surface contaminations</i> , V. Philipps, K. Flaskamp and E. Vietzke	1440
15.9. <i>Enhanced sputtering of graphite at high temperature</i> , J. Roth, J.B. Roberto and K.L. Wilson	1447
15.10. <i>Simulation of plasma disruption induced melting and vaporization by ion or electron beam</i> , A.M. Hassanein	1453
15.11. <i>Thermal effects and erosion rates from X-ray energy deposition in ICF reactor first walls</i> , A.M. Hassanein	1459
15.12. <i>Suppression of blistering in a broadly distributed ion implantation under simulated fusion first wall conditions</i> , G. Kohse and O.K. Harling	1466
15.13. <i>Scanning Auger microanalysis study of 304 stainless steel surface irradiated with helium and argon ions</i> , S. Maeda, M. Mohri, T. Yamashina and M. Kaminsky	1470
15.14. <i>Helium bubble microstructure in stainless steel implanted under various conditions</i> , P. Batfalsky and H. Schroeder	1475
15.15. <i>A practical sublimation source for large-scale chromium gettering in fusion devices</i> , J.E. Simpkins, W.A. Gabbard, L.C. Emerson and P.K. Mioduszewski	1481
15.16. <i>Surface processes occurring under reactive ion bombardment studied by secondary electron emission</i> , T. Tanabe, M. Imamura and S. Imoto	1486
15.17. <i>Effects of cold work and niobium on the blistering of zirconium by helium atoms</i> , R.H. Zee and J.F. Watters	1491

Section 16. Hydrogen in solids

16.1. <i>Plasma driven permeation of tritium in fusion reactors</i> , R.A. Kerst and W.A. Swansiger	1499
16.2. <i>Tritium permeation considerations in the MARS direct convertor</i> , M.I. Baskes, A.E. Pontau, K.L. Wilson and W.L. Barr	1511
16.3. <i>The effect of gamma radiation on the diffusion of tritium in 304 stainless steel</i> , R.A. Causey and L.M. Steck	1518

Contents to Part B

16.4. Steady state hydrogen transport in solids exposed to fusion reactor plasmas, Part II: Applications of theory, B.L. Doyle and D.K. Brice	1523
16.5. Steady state hydrogen transport in solids exposed to fusion reactor plasmas, Part III: Isotope effects, D.K. Brice	1531
16.6. Diffusivities of hydrogen in yttrium and yttrium alloys, P.W. Fisher and M. Tanase	1536
16.7. Status of tritium permeation barrier development on austenitic structural alloys, D. Stöver, H.P. Buchkremer, R. Hecker and H.J. Leyers	1541
16.8. The effect of surface composition on plasma driven permeation of deuterium through 304 stainless steel, R.A. Causey, R.A. Kerst and B.E. Mills	1547
16.9. Diffusion of hydrogen and deuterium in ZrVFe, R.J. Knize, J.L. Stanton and J.L. Cecchi	1553
16.10. Permeation of hydrogen isotopes in structural alloys, A.D. Le Claire	1558
16.11. Permeation and diffusion of hydrogen and deuterium under fission-reactor radiation, G.W. Schwarzingler and R. Dobrozemsky	1560
16.12. Reemission and permeation of deuterium implanted into metals, T. Tanabe, Y. Furuyama and S. Imoto	1563
16.13. Hydrogen transport in stainless steels, T. Tanabe, Y. Yamanishi, K. Sawada and S. Imoto	1568
16.14. Surface effects on hydrogen permeation through niobium, M. Yamawaki, T. Namba, T. Kiyoshi and M. Kanno	1573
16.15. Hydrogen trapping by yttrium in low temperature lithium, R.P. Anantatmula and H. Katsuta	1579
16.16. Implanted hydrogen effects at high concentrations in model low Z shielding materials, W.J. Choyke, R.B. Irwin, J.A. Spitznagel, S. Wood and B.O. Hall	1585
16.17. Hydrogen-enhanced fatigue crack growth in Ti-6242S, P.S. Pao and J.E. O'Neal	1587
16.18. Trapping of Sub-eV hydrogen and deuterium atoms in carbon, P.C. Stangeby, O. Auciello, A.A. Haasz and B.L. Doyle	1592
16.19. Retention and thermal release of deuterium implanted in beryllium, W.R. Wampler	1598
Section 17. Materials and design data	
17.1. Materials Handbook for fusion energy systems, J.W. Davis and T.K. Bierlein	1605
17.2. IAEA activities in the plasma-surface interaction field relevant to fusion, R.A. Langley	1607
17.3. Fusion reactor materials data, S. Iwata, A. Nogami and S. Ishino	1609
17.4. Data center activities on atomic and molecular (A&M) data for fusion in JAERI, K. Ozawa, Y. Nakai, T. Shirai and K. Shiraishi	1611
17.5. Data center activities on plasma-wall interaction at Institute of Plasma Physics at Nagoya University, Participants of the Task Group on Plasma Wall Interaction, IPP, Nagoya University (N. Itoh, Chairman)	1613
17.6. Designer's guidebook for assembly, maintenance and repair, H.S. Zahn	1615
Author index	1617
Subject index	1631