

References

- [1] Edgar LJ. Method and apparatus for controlling electric currents. Google Patents; 1930.
- [2] Weimer PK. The TFT a new thin-film transistor. Proceedings of the IRE 1962;50:1462-9.
- [3] Wang B, Huang W, Chi L, Al-Hashimi M, Marks TJ, Facchetti A. High-k gate dielectrics for emerging flexible and stretchable electronics. Chemical reviews 2018;118:5690-754.
- [4] Brotherton SD. Introduction to Thin Film Transistors: Physics and Technology of TFTs: Springer Science & Business Media; 2013.
- [5] Liu A, Zhu H, Sun H, Xu Y, Noh YY. Solution Processed Metal Oxide High- κ Dielectrics for Emerging Transistors and Circuits. Advanced Materials 2018;30:1706364.
- [6] Zeng W-J, Zhou X-Y, Pan X-J, Song C-L, Zhang H-L. High performance CMOS-like inverter based on an ambipolar organic semiconductor and low cost metals. Aip Advances 2013;3:012101.
- [7] Schroder DK. Semiconductor material and device characterization: John Wiley & Sons; 2015.
- [8] Park WJ, Shin HS, Ahn BD, Kim GH, Lee SM, Kim KH, et al. Investigation on doping dependency of solution-processed Ga-doped ZnO thin film transistor. Applied Physics Letters 2008;93:083508.
- [9] McDowell M, Hill I, McDermott J, Bernasek S, Schwartz J. Improved organic thin-film transistor performance using novel self-assembled monolayers. Applied Physics Letters 2006;88:073505.
- [10] Hoffman R, Norris BJ, Wager J. ZnO-based transparent thin-film transistors. Applied Physics Letters 2003;82:733-5.

- [11] Timp G, Agarwal A, Baumann F, Boone T, Buonanno M, Cirelli R, et al. Low leakage, ultra-thin gate oxides for extremely high performance sub-100 nm nMOSFETs. International Electron Devices Meeting IEDM Technical Digest: IEEE; 1997. p. 930-2.
- [12] Timp G, Bude J, Bourdelle K, Garno J, Ghetti A, Gossmann H, et al. The ballistic nano-transistor. International Electron Devices Meeting 1999 Technical Digest (Cat No 99CH36318): IEEE; 1999. p. 55-8.
- [13] Brody T, Luo FC, Szepesi ZP, Davies DH. A 6× 6-in 20-lpi electroluminescent display panel. IEEE transactions on electron devices 1975;22:739-48.
- [14] Wilk GD, Wallace RM, Anthony J. High- κ gate dielectrics: Current status and materials properties considerations. Journal of applied physics 2001;89:5243-75.
- [15] Sun X, Di C-a, Liu Y. Engineering of the dielectric–semiconductor interface in organic field-effect transistors. Journal of Materials Chemistry 2010;20:2599-611.
- [16] Smith WF, Hashemi J, Presuel-Moreno F. Foundations of materials science and engineering: Mcgraw-Hill Publishing; 2006.
- [17] Park S, Kim C-H, Lee W-J, Sung S, Yoon M-H. Sol-gel metal oxide dielectrics for all-solution-processed electronics. Materials Science and Engineering: R: Reports 2017;114:1-22.
- [18] Liu C-Y, Zhao K-S. Dielectric relaxations in chitosan solution with varying concentration and temperature: analysis coupled with a scaling approach and thermodynamical functions. Soft matter 2010;6:2742-50.
- [19] Robertson J. High dielectric constant gate oxides for metal oxide Si transistors. Reports on progress in Physics 2005;69:327.

- [20] Robertson J. High dielectric constant oxides. *The European Physical Journal-Applied Physics* 2004;28:265-91.
- [21] Anderson JT, Munsee CL, Hung CM, Phung TM, Herman GS, Johnson DC, et al. Solution-processed HafSO_x and ZircSO_x inorganic thin-film dielectrics and nanolaminates. *Advanced Functional Materials* 2007;17:2117-24.
- [22] Park YM, Daniel J, Heeney M, Salleo A. Room-temperature fabrication of ultrathin oxide gate dielectrics for low-voltage operation of organic field-effect transistors. *Advanced Materials* 2011;23:971-4.
- [23] Geng G, Liu G, Shan F, Liu A, Zhang Q, Lee W, et al. Improved performance of InGaZnO thin-film transistors with Ta₂O₅/Al₂O₃ stack deposited using pulsed laser deposition. *Current Applied Physics* 2014;14:S2-S6.
- [24] Cho Y-J, Shin J-H, Bobade S, Kim Y-B, Choi D-K. Evaluation of Y₂O₃ gate insulators for a-IGZO thin film transistors. *Thin Solid Films* 2009;517:4115-8.
- [25] Xu W, Cao H, Liang L, Xu J-B. Aqueous solution-deposited gallium oxide dielectric for low-temperature, low-operating-voltage indium oxide thin-film transistors: a facile route to green oxide electronics. *ACS applied materials & interfaces* 2015;7:14720-5.
- [26] Xia Y, Zhang W, Ha M, Cho JH, Renn MJ, Kim CH, et al. Printed sub-2 V gel-electrolyte-gated polymer transistors and circuits. *Advanced Functional Materials* 2010;20:587-94.
- [27] Lee J, Kaake LG, Cho JH, Zhu X-Y, Lodge TP, Frisbie CD. Ion gel-gated polymer thin-film transistors: Operating mechanism and characterization of gate dielectric capacitance, switching speed, and stability. *The Journal of Physical Chemistry C* 2009;113:8972-81.

- [28] Lee J, Panzer MJ, He Y, Lodge TP, Frisbie CD. Ion gel gated polymer thin-film transistors. *Journal of the American Chemical Society* 2007;129:4532-3.
- [29] Pal BN, Dhar BM, See KC, Katz HE. Solution-deposited sodium beta-alumina gate dielectrics for low-voltage and transparent field-effect transistors. *Nature materials* 2009;8:898-903.
- [30] Liu Y, Guan P, Zhang B, Falk ML, Katz HE. Ion dependence of gate dielectric behavior of alkali metal ion-incorporated aluminas in oxide field-effect transistors. *Chemistry of Materials* 2013;25:3788-96.
- [31] Zhang B, Liu Y, Agarwal S, Yeh M-L, Katz HE. Structure, sodium ion role, and practical issues for β -alumina as a high-k solution-processed gate layer for transparent and low-voltage electronics. *ACS applied materials & interfaces* 2011;3:4254-61.
- [32] Plunkett E, Kale TS, Zhang Q, Katz HE, Reich DH. Effects of trifluoromethyl substituents on interfacial and bulk polarization of polystyrene gate dielectrics. *Applied Physics Letters* 2019;114:023301.
- [33] Ma H, Acton O, Hutchins DO, Cernetic N, Jen AK-Y. Multifunctional phosphonic acid self-assembled monolayers on metal oxides as dielectrics, interface modification layers and semiconductors for low-voltage high-performance organic field-effect transistors. *Physical Chemistry Chemical Physics* 2012;14:14110-26.
- [34] Pujari SP, Scheres L, Marcelis AT, Zuilhof H. Covalent surface modification of oxide surfaces. *Angewandte Chemie International Edition* 2014;53:6322-56.
- [35] Acton O, Ting G, Ma H, Ka JW, Yip HL, Tucker NM, et al. π - σ -Phosphonic Acid Organic Monolayer/Sol-Gel Hafnium Oxide Hybrid Dielectrics for Low-Voltage Organic Transistors. *Advanced Materials* 2008;20:3697-701.

- [36] Ha Y-G, Everaerts K, Hersam MC, Marks TJ. Hybrid gate dielectric materials for unconventional electronic circuitry. *Accounts of chemical research* 2014;47:1019-28.
- [37] Ha Y-g, Emery JD, Bedzyk MJ, Usta H, Facchetti A, Marks TJ. Solution-deposited organic–inorganic hybrid multilayer gate dielectrics. Design, synthesis, microstructures, and electrical properties with thin-film transistors. *Journal of the American Chemical Society* 2011;133:10239-50.
- [38] Everaerts K, Emery JD, Jariwala D, Karmel HJ, Sangwan VK, Prabhumirashi PL, et al. Ambient-processable high capacitance hafnia-organic self-assembled nanodielectrics. *Journal of the American Chemical Society* 2013;135:8926-39.
- [39] Panzer MJ, Frisbie CD. Polymer electrolyte gate dielectric reveals finite windows of high conductivity in organic thin film transistors at high charge carrier densities. *Journal of the American Chemical Society* 2005;127:6960-1.
- [40] Caironi M, Noh Y-Y. *Large area and flexible electronics*: John Wiley & Sons; 2015.
- [41] Thiemann S, Sachnov S, Porscha S, Wasserscheid P, Zaumseil J. Ionic liquids for electrolyte-gating of ZnO field-effect transistors. *The Journal of Physical Chemistry C* 2012;116:13536-44.
- [42] Huang L, Jia Z, Kymissis I, O'Brien S. High K capacitors and OFET gate dielectrics from self-assembled BaTiO₃ and (Ba, Sr) TiO₃ nanocrystals in the superparaelectric limit. *Advanced functional materials* 2010;20:554-60.
- [43] Liao L, Bai J, Cheng R, Lin Y-C, Jiang S, Huang Y, et al. Top-gated graphene nanoribbon transistors with ultrathin high-k dielectrics. *Nano letters* 2010;10:1917-21.

- [44] Okur S, Yakuphanoglu F, Stathatos E. High-mobility pentacene phototransistor with nanostructured SiO₂ gate dielectric synthesized by sol-gel method. *Microelectronic engineering* 2010;87:635-40.
- [45] Kim DH, Lee HS, Yang H, Yang L, Cho K. Tunable crystal nanostructures of pentacene thin films on gate dielectrics possessing surface-order control. *Advanced Functional Materials* 2008;18:1363-70.
- [46] Esro M, Vourlias G, Somerton C, Milne WI, Adamopoulos G. High-Mobility ZnO Thin Film Transistors Based on Solution-processed Hafnium Oxide Gate Dielectrics. *Advanced Functional Materials* 2015;25:134-41.
- [47] Ren X, Pei K, Peng B, Zhang Z, Wang Z, Wang X, et al. A low-operating-power and flexible active-matrix organic-transistor temperature-sensor array. *Advanced Materials* 2016;28:4832-8.
- [48] Braendlein M, Pappa AM, Ferro M, Lopresti A, Acquaviva C, Mamessier E, et al. Lactate detection in tumor cell cultures using organic transistor circuits. *Advanced Materials* 2017;29:1605744.
- [49] Rupprecht G. Untersuchungen der elektrischen und lichtelektrischen Leitfähigkeit dünner Indiumoxydschichten. *Zeitschrift für Physik* 1954;139:504-17.
- [50] Wager JF, Hoffman R. Thin, fast, and flexible. *Ieee Spectrum* 2011;48:42-56.
- [51] Nomura K, Ohta H, Takagi A, Kamiya T, Hirano M, Hosono H. Room-temperature fabrication of transparent flexible thin-film transistors using amorphous oxide semiconductors. *nature* 2004;432:488-92.
- [52] Mott N. Silicon dioxide and the chalcogenide semiconductors; similarities and differences. *Advances in Physics* 1977;26:363-91.

- [53] Narushima S, Mizoguchi H, Shimizu K-i, Ueda K, Ohta H, Hirano M, et al. A p-Type Amorphous Oxide Semiconductor and Room Temperature Fabrication of Amorphous Oxide p–n Heterojunction Diodes. *Advanced Materials* 2003;15:1409-13.
- [54] Nomura K, Kamiya T, Ohta H, Uruga T, Hirano M, Hosono H. Local coordination structure and electronic structure of the large electron mobility amorphous oxide semiconductor In-Ga-Zn-O: Experiment and ab initio calculations. *Physical review B* 2007;75:035212.
- [55] Ueda K, Hosono H, Hamada N. Valence-band structures of layered oxychalcogenides, LaCuOCh (Ch= S, Se, and Te), studied by ultraviolet photoemission spectroscopy and energy-band calculations. *Journal of applied physics* 2005;98:043506.
- [56] Falabretti B, Robertson J. Electronic structures and doping of SnO₂, CuAlO₂, and CuInO₂. *Journal of Applied Physics* 2007;102:123703.
- [57] Togo A, Oba F, Tanaka I, Tatsumi K. First-principles calculations of native defects in tin monoxide. *Physical Review B* 2006;74:195128.
- [58] McCluskey MD, Jokela S. Defects in zno. *Journal of Applied Physics* 2009;106:10.
- [59] McCluskey M, Jokela S. Applied Physics Reviews—Focused Review. *Journal Of Applied Physics* 2009;106:071101.
- [60] Thomas SR, Pattanasattayavong P, Anthopoulos TD. Solution-processable metal oxide semiconductors for thin-film transistor applications. *Chemical Society Reviews* 2013;42:6910-23.
- [61] Kim M-G, Kim HS, Ha Y-G, He J, Kanatzidis MG, Facchetti A, et al. High-performance solution-processed amorphous zinc– indium– tin oxide thin-film transistors. *journal of the American Chemical society* 2010;132:10352-64.

- [62] Nomura K, Kamiya T, Hosono H. Ambipolar oxide thin-film transistor. *Advanced Materials* 2011;23:3431-4.
- [63] Singh AK, Janotti A, Scheffler M, Van de Walle CG. Sources of electrical conductivity in SnO₂. *Physical review letters* 2008;101:055502.
- [64] Bierwagen O, Nagata T, White ME, Tsai M-Y, Speck JS. Electron transport in semiconducting SnO₂: Intentional bulk donors and acceptors, the interface, and the surface. *Journal of Materials Research* 2012;27:2232-6.
- [65] Lany S, Zunger A. Polaronic hole localization and multiple hole binding of acceptors in oxide wide-gap semiconductors. *Physical Review B* 2009;80:085202.
- [66] Paine DC, Yaglioglu B, Beiley Z, Lee S. Amorphous IZO-based transparent thin film transistors. *Thin solid films* 2008;516:5894-8.
- [67] Zan H-W, Chen W-T, Chou C-W, Tsai C-C, Huang C-N, Hsueh H-W. Low temperature annealing with solid-state laser or UV lamp irradiation on amorphous IGZO thin-film transistors. *Electrochemical and Solid State Letters* 2010;13:H144.
- [68] Wager JF, Yeh B, Hoffman RL, Keszler DA. An amorphous oxide semiconductor thin-film transistor route to oxide electronics. *Current Opinion in Solid State and Materials Science* 2014;18:53-61.
- [69] Schwierz F. Graphene transistors: status, prospects, and problems. *Proceedings of the IEEE* 2013;101:1567-84.
- [70] Novoselov KS, Geim AK, Morozov SV, Jiang D, Zhang Y, Dubonos SV, et al. Electric field effect in atomically thin carbon films. *science* 2004;306:666-9.
- [71] Choi W, Lahiri I, Seelaboyina R, Kang YS. Synthesis of graphene and its applications: a review. *Critical Reviews in Solid State and Materials Sciences* 2010;35:52-71.

- [72] Wang Y, Huang B-C, Zhang M, Woo JC. Optimizing the fabrication process for high performance graphene field effect transistors. *Microelectronics Reliability* 2012;52:1602-5.
- [73] Xu W, Lim TS, Seo HK, Min SY, Cho H, Park MH, et al. N-Doped Graphene Field-Effect Transistors with Enhanced Electron Mobility and Air-Stability. *Small* 2014;10:1999-2005.
- [74] Geim AK. Graphene: status and prospects. *science* 2009;324:1530-4.
- [75] Schwierz F. Graphene transistors. *Nature nanotechnology* 2010;5:487.
- [76] Neto AC, Guinea F, Peres NM, Novoselov KS, Geim AK. The electronic properties of graphene. *Reviews of modern physics* 2009;81:109.
- [77] Champlain JG. A first principles theoretical examination of graphene-based field effect transistors. *Journal of Applied Physics* 2011;109:084515.
- [78] Jiang J-W, Wang J-S, Li B. Young's modulus of graphene: a molecular dynamics study. *Physical Review B* 2009;80:113405.
- [79] Lee C, Wei X, Kysar JW, Hone J. Measurement of the elastic properties and intrinsic strength of monolayer graphene. *science* 2008;321:385-8.
- [80] Zhu Y, Murali S, Cai W, Li X, Suk JW, Potts JR, et al. Graphene and graphene oxide: synthesis, properties, and applications. *Advanced materials* 2010;22:3906-24.
- [81] Ni Z, Wang H, Kasim J, Fan H, Yu T, Wu YH, et al. Graphene thickness determination using reflection and contrast spectroscopy. *Nano letters* 2007;7:2758-63.
- [82] Childres I, Jauregui LA, Park W, Cao H, Chen YP. Raman spectroscopy of graphene and related materials. *New developments in photon and materials research* 2013;1:1-20.
- [83] Schneller T, Waser R, Kosec M, Payne D. *Chemical solution deposition of functional oxide thin films*: Springer; 2013.

- [84] Pasquarelli RM, Ginley DS, O'Hayre R. Solution processing of transparent conductors: from flask to film. *Chemical Society Reviews* 2011;40:5406-41.
- [85] Exarhos GJ, Zhou X-D. Discovery-based design of transparent conducting oxide films. *Thin solid films* 2007;515:7025-52.
- [86] Glynn C, O'Dwyer C. Solution processable metal oxide thin film deposition and material growth for electronic and photonic devices. *Advanced Materials Interfaces* 2017;4:1600610.
- [87] Fukuda K, Someya T. Recent Progress in the Development of Printed Thin-Film Transistors and Circuits with High-Resolution Printing Technology. *Advanced Materials* 2017;29:1602736.
- [88] Liu A, Liu G, Zhu C, Zhu H, Fortunato E, Martins R, et al. Solution-Processed Alkaline Lithium Oxide Dielectrics for Applications in n-and p-Type Thin-Film Transistors. *Advanced Electronic Materials* 2016;2:1600140.
- [89] Park JH, Kim K, Yoo YB, Park SY, Lim K-H, Lee KH, et al. Water adsorption effects of nitrate ion coordinated Al₂O₃ dielectric for high performance metal-oxide thin-film transistor. *Journal of Materials Chemistry C* 2013;1:7166-74.
- [90] Rim YS, Chen H, Liu Y, Bae S-H, Kim HJ, Yang Y. Direct light pattern integration of low-temperature solution-processed all-oxide flexible electronics. *ACS nano* 2014;8:9680-6.
- [91] Seon J-B, Lee S, Kim JM, Jeong H-D. Spin-coated CdS thin films for n-channel thin film transistors. *Chemistry of Materials* 2009;21:604-11.
- [92] Lee C-G, Dutta S, Dodabalapur A. Solution-processed ZTO TFTs with recessed gate and low operating voltage. *IEEE electron device letters* 2010;31:1410-2.

- [93] Azmi A, Lee J, Gim TJ, Choi R, Jeong JK. Performance improvement of p-channel tin monoxide transistors with a solution-processed zirconium oxide gate dielectric. *IEEE Electron Device Letters* 2017;38:1543-6.
- [94] Bukke RN, Avis C, Naik MN, Jang J. Remarkable increase in field effect mobility of amorphous IZTO thin-film transistors with purified ZrO_x gate insulator. *IEEE Electron Device Letters* 2018;39:371-4.
- [95] Liu A, Liu G, Zhu H, Meng Y, Song H, Shin B, et al. A water-induced high-k yttrium oxide dielectric for fully-solution-processed oxide thin-film transistors. *Current Applied Physics* 2015;15:S75-S81.
- [96] Jiang G, Liu A, Liu G, Zhu C, Meng Y, Shin B, et al. Solution-processed high-k magnesium oxide dielectrics for low-voltage oxide thin-film transistors. *Applied Physics Letters* 2016;109:183508.
- [97] Sharma A, Chourasia NK, Sugathan A, Kumar Y, Jit S, Liu S-W, et al. Solution processed Li₅AlO₄ dielectric for low voltage transistor fabrication and its application in metal oxide/quantum dot heterojunction phototransistors. *Journal of Materials Chemistry C* 2018;6:790-8.
- [98] Sharma A, Chourasia NK, Acharya V, Pal N, Biring S, Liu S-W, et al. Ultra-Low Voltage Metal Oxide Thin Film Transistor by Low-Temperature Annealed Solution Processed LiAlO₂ Gate Dielectric. *Electronic Materials Letters* 2020;16:22-34.
- [99] Chourasia NK, Sharma A, Acharya V, Pal N, Biring S, Pal BN. Solution processed low band gap ion-conducting gate dielectric for low voltage metal oxide transistor. *Journal of Alloys and Compounds* 2019;777:1124-32.

- [100] Adamopoulos G, Bashir A, Thomas S, Gillin WP, Georgakopoulos S, Shkunov M, et al. Spray-Deposited Li-Doped ZnO Transistors with Electron Mobility Exceeding 50 cm²/Vs. *Advanced Materials* 2010;22:4764-9.
- [101] Adamopoulos G, Thomas S, PH wobkenberg, DDC Bradley, MA Mclachlan and TD Anthopoulos. *Adv Mater* 2011;23:1894-8.
- [102] Pattanasattayavong P, Thomas S, Adamopoulos G, McLachlan MA, Anthopoulos TD. p-channel thin-film transistors based on spray-coated Cu₂O films. *Applied Physics Letters* 2013;102:163505.
- [103] Thomas SR, Adamopoulos G, Lin Y-H, Faber H, Sygellou L, Stratakis E, et al. High electron mobility thin-film transistors based on Ga₂O₃ grown by atmospheric ultrasonic spray pyrolysis at low temperatures. *Applied Physics Letters* 2014;105:092105.
- [104] Petti L, Faber H, Münzenrieder N, Cantarella G, Patsalas PA, Tröster G, et al. Low-temperature spray-deposited indium oxide for flexible thin-film transistors and integrated circuits. *Applied Physics Letters* 2015;106:092105.
- [105] Isakov I, Faber H, Grell M, Wyatt-Moon G, Pliatsikas N, Kehagias T, et al. Exploring the Leidenfrost Effect for the Deposition of High-Quality In₂O₃ Layers via Spray Pyrolysis at Low Temperatures and Their Application in High Electron Mobility Transistors. *Advanced Functional Materials* 2017;27:1606407.
- [106] Mottram AD, Pattanasattayavong P, Isakov I, Wyatt-Moon G, Faber H, Lin Y-H, et al. Electron mobility enhancement in solution-processed low-voltage In₂O₃ transistors via channel interface planarization. *AIP Advances* 2018;8:065015.

- [107] Esro M, Mazzocco R, Vourlias G, Kolosov O, Krier A, Milne W, et al. Solution processed lanthanum aluminate gate dielectrics for use in metal oxide-based thin film transistors. *Applied Physics Letters* 2015;106:203507.
- [108] Subramanian V, Cen J, de la Fuente Vornbrock A, Grau G, Kang H, Kitsomboonloha R, et al. High-speed printing of transistors: From inks to devices. *Proceedings of the IEEE* 2015;103:567-82.
- [109] Singh M, Haverinen HM, Dhagat P, Jabbour GE. Inkjet printing—process and its applications. *Advanced materials* 2010;22:673-85.
- [110] Fukuda K, Someya T. *Printing Technology: Recent Progress in the Development of Printed Thin-Film Transistors and Circuits with High-Resolution Printing Technology* (*Adv. Mater.* 25/2017). *Advanced Materials* 2017;29.
- [111] Jang J, Kang H, Chakravarthula HCN, Subramanian V. Fully Inkjet-Printed Transparent Oxide Thin Film Transistors Using a Fugitive Wettability Switch. *Advanced Electronic Materials* 2015;1:1500086.
- [112] Houssa M. *High-k Gate Dielectrics*: CRC Press, Taylor & Francis Group; 2003.
- [113] Ortiz RP, Facchetti A, Marks TJ. High-k Organic, Inorganic, and Hybrid Dielectrics for Low-Voltage Organic Field-Effect Transistors. *Chemical Reviews* 2010;110:205-39.
- [114] Gusev EP, Buchanan DA, Cartier E, Kumar A, DiMaria D, Guha S, et al. Ultrathin high-K gate stacks for advanced CMOS devices. *International Electron Devices Meeting Technical Digest (Cat No01CH37224)*2001. p. 20.1.1-.1.4.
- [115] Zhang L, Li J, Zhang XW, Jiang XY, Zhang ZL. High performance ZnO-thin-film transistor with Ta₂O₅ dielectrics fabricated at room temperature. *Appl Phys Lett* 2009;95:072112.

- [116] Song K, Yang W, Jung Y, Jeong S, Moon J. A solution-processed yttrium oxide gate insulator for high-performance all-solution-processed fully transparent thin film transistors. *J Mater Chem* 2012;22:21265-71.
- [117] Majewski LA, Schroeder R, Grell M. Low-Voltage, High-Performance Organic Field-Effect Transistors with an Ultra-Thin TiO₂ Layer as Gate Insulator. *Adv Funct Mater* 2005;15:1017-22.
- [118] Sung S, Park S, Lee W-J, Son J, Kim C-H, Kim Y, et al. Low-Voltage Flexible Organic Electronics Based on High-Performance Sol–Gel Titanium Dioxide Dielectric. *ACS Appl Mater Interfaces* 2015;7:7456-61.
- [119] Zhu C, Liu A, Liu G, Jiang G, Meng Y, Fortunato E, et al. Low-temperature, nontoxic water-induced high-k zirconium oxide dielectrics for low-voltage, high-performance oxide thin-film transistors. *J Mater Chem C* 2016;4:10715-21.
- [120] Park JH, Yoo YB, Lee KH, Jang WS, Oh JY, Chae SS, et al. Low-Temperature, High-Performance Solution-Processed Thin-Film Transistors with Peroxo-Zirconium Oxide Dielectric. *ACS Appl Mater Interfaces* 2013;5:410-7.
- [121] Esro M, Vourlias G, Somerton C, Milne WI, Adamopoulos G. High-Mobility ZnO Thin Film Transistors Based on Solution-processed Hafnium Oxide Gate Dielectrics. *Adv Funct Mater* 2015;25:134-41.
- [122] Ko J, Kim J, Park SY, Lee E, Kim K, Lim K-H, et al. Solution-processed amorphous hafnium-lanthanum oxide gate insulator for oxide thin-film transistors. *J Mater Chem C* 2014;2:1050-6.
- [123] Plassmeyer PN, Archila K, Wager JF, Page CJ. Lanthanum Aluminum Oxide Thin-Film Dielectrics from Aqueous Solution. *ACS Appl Mater Interfaces* 2015;7:1678-84.

- [124] Wilk GD, Wallace RM. Electrical properties of hafnium silicate gate dielectrics deposited directly on silicon. *Appl Phys Lett* 1999;74:2854-6.
- [125] Wilk GD, Wallace RM. Stable zirconium silicate gate dielectrics deposited directly on silicon. *Appl Phys Lett* 2000;76:112-4.
- [126] Pal BN, Dhar BM, See KC, Katz HE. Solution-deposited sodium beta-alumina gate dielectrics for low-voltage and transparent field-effect transistors. *Nat Mater* 2009;8:898-903.
- [127] Bo Zhang YL, Shweta Agarwal, Ming-Ling Yeh, Howard E Katz. Structure, sodium ion role, and practical issues for β -alumina as a high-k solution-processed gate layer for transparent and low-voltage electronics. *ACS Appl Mater Interfaces* 2011;3:4254-61.
- [128] Yu Liu PG, Bo Zhang, Michael L Falk, Howard E Katz. Ion dependence of gate dielectric behavior of alkali metal ion-incorporated aluminas in oxide field-effect transistors. *Chem Mater* 2013;25:3788-96.
- [129] Yu Liu AKD, and Howard E. Katz. Ion polarization behavior in alumina under pulsed gate bias stress. *Appl Phys Lett* 2015;106:112906.
- [130] Sharma A, Chourasia NK, Sugathan A, Kumar Y, Jit S, Liu S-W, et al. Solution processed Li₅AlO₄ dielectric for low voltage transistor fabrication and its application in metal oxide/quantum dot heterojunction phototransistors. *Journal of Materials Chemistry C* 2018;6:790-8.
- [131] Liu A, Liu G, Zhu C, Zhu H, Fortunato E, Martins R, et al. Solution-Processed Alkaline Lithium Oxide Dielectrics for Applications in n- and p-Type Thin-Film Transistors. *Adv Electron Mater* 2016;2:n/a-n/a.
- [132] Liu J, Banis MN, Li X, Lushington A, Cai M, Li R, et al. Atomic Layer Deposition of Lithium Tantalate Solid-State Electrolytes. *J Phys Chem C* 2013;117:20260-7.

- [133] Nayak PK, Jang J, Lee C, Hong Y. Effects of Li doping on the performance and environmental stability of solution processed ZnO thin film transistors. *Applied Physics Letters* 2009;95:193503.
- [134] Hubička Z, Čada M, Potůček Z, Ptáček P, Št, x, et al. Low pressure deposition of $\text{Li}_x\text{Zn}_{1-x}\text{O}$ thin films by means of RF plasma jet system. *Thin Solid Films* 2004;447-448:656-62.
- [135] Jeon H-j, Lee S-G, Kim H, Park J-S. Enhanced mobility of Li-doped ZnO thin film transistors fabricated by mist chemical vapor deposition. *Applied Surface Science* 2014;301:358-62.
- [136] Tsukamoto K, Yamagishi C, Koumoto K, Yanagida H. Electrical properties of ceramics in the system $\text{Li}_2\text{O}-\text{ZnO}$. *Journal of Materials Science* 1984;19:2493-500.
- [137] Kulawik D, Źarska S, Folentarska A, Pavlyuk V, Ciesielski W. Synthesis, characterization, and catalytic properties of the Li-doped ZnO. *Journal of Thermal Analysis and Calorimetry* 2018.
- [138] George Adamopoulos ST, Paul H. Wöbkenberg, Donal D. C. Bradley, Martyn A. McLachlan, Thomas D. Anthopoulos. High-Mobility Low-Voltage ZnO and Li-Doped ZnO Transistors Based on ZrO_2 High-k Dielectric Grown by Spray Pyrolysis in Ambient Air. *Adv Mater* 2011;23:1894–8.
- [139] Pavlyuk V, Misztal R, Ciesielski W. Structural and Thermal Characterization of the Incorporation of Lithium into ZnO. *European Journal of Inorganic Chemistry* 2014;2014:925-31.

- [140] Liu F, Qian C, Sun J, Liu P, Huang Y, Gao Y, et al. Solution-processed lithium-doped zinc oxide thin-film transistors at low temperatures between 100 and 300 °C. *Applied Physics A* 2016;122:311.
- [141] Chen JT, Wang J, Zhuo RF, Yan D, Feng JJ, Zhang F, et al. The effect of Al doping on the morphology and optical property of ZnO nanostructures prepared by hydrothermal process. *Applied Surface Science* 2009;255:3959-64.
- [142] Islam MN, Ghosh TB, Chopra KL, Acharya HN. XPS and X-ray diffraction studies of aluminum-doped zinc oxide transparent conducting films. *Thin Solid Films* 1996;280:20-5.
- [143] Qian C, Sun J, Zhang L, Huang H, Yang J, Gao Y. Crystal-Domain Orientation and Boundary in Highly Ordered Organic Semiconductor Thin Film. *The Journal of Physical Chemistry C* 2015;119:14965-71.
- [144] Song K, Yang W, Jung Y, Jeong S, Moon J. A solution-processed yttrium oxide gate insulator for high-performance all-solution-processed fully transparent thin film transistors. *Journal of Materials Chemistry* 2012;22:21265-71.
- [145] Ju C, Park C, Yang H, Kim U, Kim YM, Char K. High mobility field effect transistor of SnOx on glass using HfOx gate oxide. *Current Applied Physics* 2016;16:300-4.
- [146] E. Fortunato PB, and R. Martins. Oxide Semiconductor Thin-Film Transistors: A Review of Recent Advances. *Adv Mater* 2012;24:2945–86.
- [147] D.M P, Mannam R, Rao MSR, DasGupta N. Effect of annealing ambient on SnO2 thin film transistors. *Applied Surface Science* 2017;418:414-7.
- [148] Ebrard E, Allard B, Candelier P, Waltz P. Review of fuse and antifuse solutions for advanced standard CMOS technologies. *Microelectronics Journal* 2009;40:1755-65.

- [149] Coban AL, Allen PE, Xudong S. Low-voltage analog IC design in CMOS technology. *IEEE Transactions on Circuits and Systems I: Fundamental Theory and Applications* 1995;42:955-8.
- [150] Yuan J, Svensson C. High-speed CMOS circuit technique. *IEEE Journal of Solid-State Circuits* 1989;24:62-70.
- [151] Dhananjay, Chu C-W, Ou C-W, Wu M-C, Ho Z-Y, Ho K-C, et al. Complementary inverter circuits based on p-SnO₂ and n-In₂O₃ thin film transistors. *Applied Physics Letters* 2008;92:232103.
- [152] Yang J, Wang Y, Li Y, Yuan Y, Hu Z, Ma P, et al. Highly Optimized Complementary Inverters Based on p-SnO and n-InGaZnO With High Uniformity. *IEEE Electron Device Letters* 2018;39:516-9.
- [153] Zaumseil J, Sirringhaus H. Electron and Ambipolar Transport in Organic Field-Effect Transistors. *Chemical Reviews* 2007;107:1296-323.
- [154] Meijer EJ, de Leeuw DM, Setayesh S, van Veenendaal E, Huisman BH, Blom PWM, et al. Solution-processed ambipolar organic field-effect transistors and inverters. *Nature Materials* 2003;2:678-82.
- [155] Bisri SZ, Piliego C, Gao J, Loi MA. Outlook and Emerging Semiconducting Materials for Ambipolar Transistors. *Advanced Materials* 2014;26:1176-99.
- [156] Muhieddine K, Ullah M, Pal BN, Burn P, Namdas EB. All Solution-Processed, Hybrid Light Emitting Field-Effect Transistors. *Advanced Materials* 2014;26:6410-5.
- [157] Chang H-C, Lu C, Liu C-L, Chen W-C. Single-Crystal C₆₀ Needle/CuPc Nanoparticle Double Floating-Gate for Low-Voltage Organic Transistors Based Non-Volatile Memory Devices. *Advanced Materials* 2015;27:27-33.

- [158] Wu J, Fan C, Xue G, Ye T, Liu S, Lin R, et al. Interfacing Solution-Grown C60 and (3-Pyrrolinium)(CdCl₃) Single Crystals for High-Mobility Transistor-Based Memory Devices. *Advanced Materials* 2015;27:4476-80.
- [159] Pal BN, Trottman P, Sun J, Katz HE. Solution-Deposited Zinc Oxide and Zinc Oxide/Pentacene Bilayer Transistors: High Mobility n-Channel, Ambipolar, and Nonvolatile Devices. *Advanced Functional Materials* 2008;18:1832-9.
- [160] Tian H, Guo Q, Xie Y, Zhao H, Li C, Cha JJ, et al. Anisotropic Black Phosphorus Synaptic Device for Neuromorphic Applications. *Advanced Materials* 2016;28:4991-7.
- [161] Byon K, Tham D, Fischer JE, Johnson AT. Systematic study of contact annealing: Ambipolar silicon nanowire transistor with improved performance. *Applied Physics Letters* 2007;90:143513.
- [162] Shimada T, Sugai T, Ohno Y, Kishimoto S, Mizutani T, Yoshida H, et al. Double-wall carbon nanotube field-effect transistors: Ambipolar transport characteristics. *Applied Physics Letters* 2004;84:2412-4.
- [163] Li H, Zhang Q, Liu C, Xu S, Gao P. Ambipolar to Unipolar Conversion in Graphene Field-Effect Transistors. *ACS Nano* 2011;5:3198-203.
- [164] Anthopoulos TD, Setayesh S, Smits E, Cölle M, Cantatore E, de Boer B, et al. Air-Stable Complementary-like Circuits Based on Organic Ambipolar Transistors. *Advanced Materials* 2006;18:1900-4.
- [165] Anthopoulos TD, Tanase C, Setayesh S, Meijer EJ, Hummelen JC, Blom PWM, et al. Ambipolar Organic Field-Effect Transistors Based on a Solution-Processed Methanofullerene. *Advanced Materials* 2004;16:2174-9.

- [166] Ren Y, Yang X, Zhou L, Mao J-Y, Han S-T, Zhou Y. Recent Advances in Ambipolar Transistors for Functional Applications. *Advanced Functional Materials* 2019;29:1902105.
- [167] Nomura K, Kamiya T, Hosono H. Ambipolar Oxide Thin-Film Transistor. *Advanced Materials* 2011;23:3431-4.
- [168] Sharma A, Chourasia NK, Pal N, Biring S, Pal BN. Role of Electron Donation of TiO₂ Gate Interface for Developing Solution-Processed High-Performance One-Volt Metal-Oxide Thin-Film Transistor Using Ion-Conducting Gate Dielectric. *The Journal of Physical Chemistry C* 2019;123:20278-86.
- [169] Sharma A, Chourasia NK, Acharya V, Pal N, Biring S, Liu S-W, et al. Ultra-Low Voltage Metal Oxide Thin Film Transistor by Low-Temperature Annealed Solution Processed LiAlO₂ Gate Dielectric. *Electronic Materials Letters* 2019.
- [170] Pal N, Sharma A, Acharya V, Chourasia NK, Biring S, Pal BN. Gate Interface Engineering for Subvolt Metal Oxide Transistor Fabrication by Using Ion-Conducting Dielectric with Mn₂O₃ Gate Interface. *ACS Applied Electronic Materials* 2019.
- [171] Klauk H. A change of direction. *Nature Materials* 2009;8:853-4.
- [172] Li Y, Yang J, Qu Y, Zhang J, Zhou L, Yang Z, et al. Ambipolar SnO_x thin-film transistors achieved at high sputtering power. *Applied Physics Letters* 2018;112:182102.
- [173] Fortunato E, Barros R, Barquinha P, Figueiredo V, Park S-HK, Hwang C-S, et al. Transparent p-type SnO_x thin film transistors produced by reactive rf magnetron sputtering followed by low temperature annealing. *Applied Physics Letters* 2010;97:052105.
- [174] Ogo Y, Hiramatsu H, Nomura K, Yanagi H, Kamiya T, Hirano M, et al. p-channel thin-film transistor using p-type oxide semiconductor, SnO. *Applied Physics Letters* 2008;93:032113.

- [175] Mao Q, Ji Z, Zhao L. Mobility enhancement of p-type SnO₂ by In–Ga co-doping. *physica status solidi (b)* 2010;247:299-302.
- [176] Qin G, Li D, Feng Z, Liu S. First principles study on the properties of p-type conducting In:SnO₂. *Thin Solid Films* 2009;517:3345-9.
- [177] Tsay C-Y, Liang S-C. Fabrication of p-type conductivity in SnO₂ thin films through Ga doping. *Journal of Alloys and Compounds* 2015;622:644-50.
- [178] Ji Z, He Z, Song Y, Liu K, Ye Z. Fabrication and characterization of indium-doped p-type SnO₂ thin films. *Journal of Crystal Growth* 2003;259:282-5.
- [179] Sung MM, Kim CG, Kim Y-S. Chemical Vapor Deposition of β -LiGaO₂ Films on Si (100) Using a Novel Single Precursor. *Bulletin of the Korean Chemical Society* 2004;25:480-4.
- [180] Presley R, Munsee C, Park C, Hong D, Wager J, Keszler D. Tin oxide transparent thin-film transistors. *Journal of Physics D: Applied Physics* 2004;37:2810.
- [181] Kushida K, Kuriyama K. Band gap of LiInO₂ synthesized by a sol–gel method. *physica status solidi c* 2006;3:2800-3.
- [182] Singh AK, Janotti A, Scheffler M, Van de Walle CG. Sources of Electrical Conductivity in SnO_2 . *Physical Review Letters* 2008;101:055502.
- [183] Bierwagen O, Nagata T, White ME, Tsai M-Y, Speck JS. Electron transport in semiconducting SnO₂: Intentional bulk donors and acceptors, the interface, and the surface. *Journal of Materials Research* 2012;27:2232-6.
- [184] Zhao J, Zhao XJ, Ni JM, Tao HZ. Structural, electrical and optical properties of p-type transparent conducting SnO₂:Al film derived from thermal diffusion of Al/SnO₂/Al multilayer thin films. *Acta Materialia* 2010;58:6243-8.

- [185] Fortunato E, Barquinha P, Martins R. Oxide Semiconductor Thin-Film Transistors: A Review of Recent Advances. *Advanced Materials* 2012;24:2945-86.
- [186] Du X, Skachko I, Barker A, Andrei EY. Approaching ballistic transport in suspended graphene. *Nature nanotechnology* 2008;3:491.
- [187] Reddy D, Register LF, Carpenter GD, Banerjee SK. Graphene field-effect transistors. *Journal of Physics D: Applied Physics* 2011;44:313001.
- [188] Schwierz F. Graphene transistors. *Nature Nanotechnology* 2010;5:487.
- [189] Chen Y, Zhang B, Liu G, Zhuang X, Kang E-T. Graphene and its derivatives: switching ON and OFF. *Chemical Society Reviews* 2012;41:4688-707.
- [190] Yu Wang Y, Burke PJ. A large-area and contamination-free graphene transistor for liquid-gated sensing applications. *Applied physics letters* 2013;103:052103.
- [191] Guo S-R, Lin J, Penchev M, Yengel E, Ghazinejad M, Ozkan CS, et al. Label free DNA detection using large area graphene based field effect transistor biosensors. *Journal of nanoscience and nanotechnology* 2011;11:5258-63.
- [192] Yan Q, Huang B, Yu J, Zheng F, Zang J, Wu J, et al. Intrinsic Current–Voltage Characteristics of Graphene Nanoribbon Transistors and Effect of Edge Doping. *Nano Letters* 2007;7:1469-73.
- [193] Wang X, Ouyang Y, Li X, Wang H, Guo J, Dai H. Room-Temperature All-Semiconducting Sub-10-nm Graphene Nanoribbon Field-Effect Transistors. *Physical Review Letters* 2008;100:206803.
- [194] Zhang W, Lin C-T, Liu K-K, Tite T, Su C-Y, Chang C-H, et al. Opening an Electrical Band Gap of Bilayer Graphene with Molecular Doping. *ACS Nano* 2011;5:7517-24.

- [195] Szafranek BN, Schall D, Otto M, Neumaier D, Kurz H. High On/Off Ratios in Bilayer Graphene Field Effect Transistors Realized by Surface Dopants. *Nano Letters* 2011;11:2640-3.
- [196] Tsukagoshi K, Li SL, Miyazaki H, Aparecido-Ferreira A, Nakaharai S. Semiconducting properties of bilayer graphene modulated by an electric field for next-generation atomic-film electronics. *Journal of Physics D: Applied Physics* 2014;47:094003.
- [197] Xia F, Farmer DB, Lin Y-m, Avouris P. Graphene Field-Effect Transistors with High On/Off Current Ratio and Large Transport Band Gap at Room Temperature. *Nano Letters* 2010;10:715-8.
- [198] Lin Y, Chiu H, Jenkins KA, Farmer DB, Avouris P, Valdes-Garcia A. Dual-Gate Graphene FETs With f_{T} of 50 GHz. *IEEE Electron Device Letters* 2010;31:68-70.
- [199] Mukherjee S, Kaloni T. Electronic properties of boron-and nitrogen-doped graphene: a first principles study. *Journal of Nanoparticle Research* 2012;14:1059.
- [200] Zhu C, Dong S. Recent progress in graphene-based nanomaterials as advanced electrocatalysts towards oxygen reduction reaction. *Nanoscale* 2013;5:1753-67.
- [201] Ci L, Song L, Jin C, Jariwala D, Wu D, Li Y, et al. Atomic layers of hybridized boron nitride and graphene domains. *Nature materials* 2010;9:430.
- [202] Farjam M, Rafii-Tabar H. Energy gap opening in submonolayer lithium on graphene: Local density functional and tight-binding calculations. *Physical Review B* 2009;79:045417.
- [203] Ye M, Quhe R, Zheng J, Ni Z, Wang Y, Yuan Y, et al. Tunable band gap in germanene by surface adsorption. *Physica E: Low-dimensional Systems and Nanostructures* 2014;59:60-5.

- [204] Caffrey NM, Johansson LI, Xia C, Armiento R, Abrikosov IA, Jacobi C. Structural and electronic properties of Li-intercalated graphene on SiC(0001). *Physical Review B* 2016;93:195421.
- [205] Virojanadara C, Watcharinyanon S, Zakharov AA, Johansson LI. Epitaxial graphene on $6H\text{-SiC}$ and Li intercalation. *Physical Review B* 2010;82:205402.
- [206] Mintae R, Paengro L, Jingul K, Heemin P, Jinwook C. Band gap engineering for single-layer graphene by using slow Li + ions. *Nanotechnology* 2016;27:31LT03.
- [207] Lu G, Yu K, Wen Z, Chen J. Semiconducting graphene: converting graphene from semimetal to semiconductor. *Nanoscale* 2013;5:1353-68.
- [208] Singh VK, Kumar S, Pandey SK, Srivastava S, Mishra M, Gupta G, et al. Fabrication of sensitive bioelectrode based on atomically thin CVD grown graphene for cancer biomarker detection. *Biosensors and Bioelectronics* 2018;105:173-81.
- [209] Srivastava A, Galande C, Ci L, Song L, Rai C, Jariwala D, et al. Novel liquid precursor-based facile synthesis of large-area continuous, single, and few-layer graphene films. *Chemistry of Materials* 2010;22:3457-61.
- [210] Pal BN, Dhar BM, See KC, Katz HE. Solution-deposited sodium beta-alumina gate dielectrics for low-voltage and transparent field-effect transistors. *Nat Mater* 2009;8:898-903.
- [211] Yoldas BE. Alumina sol preparation from alkoxide. *Am Ceram Soc Bull* 1975;54:289-90.
- [212] Yoldas BE. Transparent porous alumina. . *Am Ceram Soc Bull* 1975;54:286-8

- [213] Chae SJ, Güneş F, Kim KK, Kim ES, Han GH, Kim SM, et al. Synthesis of large-area graphene layers on poly-nickel substrate by chemical vapor deposition: wrinkle formation. *Advanced Materials* 2009;21:2328-33.
- [214] Malard L, Pimenta M, Dresselhaus G, Dresselhaus M. Raman spectroscopy in graphene. *Physics Reports* 2009;473:51-87.
- [215] Hao Y, Wang Y, Wang L, Ni Z, Wang Z, Wang R, et al. Probing layer number and stacking order of few-layer graphene by Raman spectroscopy. *small* 2010;6:195-200.
- [216] Wang Y, Huang B-C, Zhang M, Woo JCS. Optimizing the fabrication process for high performance graphene field effect transistors. *Microelectronics Reliability* 2012;52:1602-5.
- [217] Kim BJ, Jang H, Lee S-K, Hong BH, Ahn J-H, Cho JH. High-Performance Flexible Graphene Field Effect Transistors with Ion Gel Gate Dielectrics. *Nano Letters* 2010;10:3464-6.
- [218] Xu W, Lim T-S, Seo H-K, Min S-Y, Cho H, Park M-H, et al. N-Doped Graphene Field-Effect Transistors with Enhanced Electron Mobility and Air-Stability. *Small* 2014;10:1999-2005.
- [219] Bisti F, Profeta G, Vita H, Donarelli M, Perrozzi F, Sheverdyeva PM, et al. Electronic and geometric structure of graphene/SiC(0001) decoupled by lithium intercalation. *Physical Review B* 2015;91:245411.
- [220] Zhong H, Zhang Z, Xu H, Qiu C, Peng L-M. Comparison of mobility extraction methods based on field-effect measurements for graphene. *AIP Advances* 2015;5:057136.
- [221] Meric I, Han MY, Young AF, Ozyilmaz B, Kim P, Shepard KL. Current saturation in zero-bandgap, top-gated graphene field-effect transistors. *Nature Nanotechnology* 2008;3:654.

- [222] Kim S, Nah J, Jo I, Shahrjerdi D, Colombo L, Yao Z, et al. Realization of a high mobility dual-gated graphene field-effect transistor with Al₂O₃ dielectric. *Applied Physics Letters* 2009;94:062107.
- [223] Ponomarenko LA, Yang R, Gorbachev RV, Blake P, Mayorov AS, Novoselov KS, et al. Density of States and Zero Landau Level Probed through Capacitance of Graphene. *Physical Review Letters* 2010;105:136801.
- [224] Zhang Y, Zhang L, Zhou C. Review of chemical vapor deposition of graphene and related applications. *Accounts of chemical research* 2013;46:2329-39.
- [225] Ricciardella F, Vollebregt S, Polichetti T, Alfano B, Massera E, Sarro P. High sensitive gas sensors realized by a transfer-free process of CVD graphene. *2016 IEEE SENSORS: IEEE*; 2016. p. 1-3.
- [226] Chen S, Cai W, Chen D, Ren Y, Li X, Zhu Y, et al. Adsorption/desorption and electrically controlled flipping of ammonia molecules on graphene. *New Journal of Physics* 2010;12:125011.
- [227] Romero HE, Joshi P, Gupta AK, Gutierrez HR, Cole MW, Tadigadapa SA, et al. Adsorption of ammonia on graphene. *Nanotechnology* 2009;20:245501.
- [228] Mishra AK, Jarwal DK, Mukherjee B, Kumar A, Ratan S, Jit S. CuO Nanowire-Based Extended-Gate Field-Effect-Transistor (FET) for pH Sensing and Enzyme-Free/Receptor-Free Glucose Sensing Applications. *IEEE Sensors Journal* 2020;20:5039-47.
- [229] Gautam M, Jayatissa AH. Gas sensing properties of graphene synthesized by chemical vapor deposition. *Materials Science and Engineering: C* 2011;31:1405-11.
- [230] Yuan W, Shi G. Graphene-based gas sensors. *Journal of Materials Chemistry A* 2013;1:10078-91.

- [231] Pearce R, Iakimov T, Andersson M, Hultman L, Spetz AL, Yakimova R. Epitaxially grown graphene based gas sensors for ultra sensitive NO₂ detection. *Sensors and Actuators B: Chemical* 2011;155:451-5.
- [232] Yoon HJ, Yang JH, Zhou Z, Yang SS, Cheng MM-C. Carbon dioxide gas sensor using a graphene sheet. *Sensors and Actuators B: Chemical* 2011;157:310-3.
- [233] Xu K, Zhu L, Zhang A, Jiang G, Tang H. A peculiar cyclic voltammetric behavior of polyaniline in acetonitrile and its application in ammonia vapor sensor. *Journal of Electroanalytical Chemistry* 2007;608:141-7.
- [234] Han S-J, Garcia AV, Oida S, Jenkins KA, Haensch W. Graphene radio frequency receiver integrated circuit. *Nature communications* 2014;5:1-6.
- [235] Schedin F, Geim AK, Morozov SV, Hill E, Blake P, Katsnelson M, et al. Detection of individual gas molecules adsorbed on graphene. *Nature materials* 2007;6:652-5.
- [236] Son K-A, Yang B, Seo H-C, Wong D, Moon JS, Hussain T. High-Speed Graphene Field Effect Transistors on Microbial Cellulose Biomembrane. *IEEE Transactions on Nanotechnology* 2017;16:239-44.
- [237] Singh AK, Chourasia NK, Pal BN, Pandey A, Chakrabarti P. Low Operating Voltage Solution Processed (Li₂ZnO₂) Dielectric and (SnO₂) Channel-Based Medium Wave UV-B Phototransistor for Application in Phototherapy. *IEEE Transactions on Electron Devices* 2020;67:2028-34.
- [238] Bonmann M, Asad M, Yang X, Generalov A, Vorobiev A, Banszerus L, et al. Graphene Field-Effect Transistors With High Extrinsic f_{-T} and f_{-max} . *IEEE Electron Device Letters* 2018;40:131-4.