

DAFTAR PUSTAKA

- Adli, H.K., Harada, T., Septina, W., Hozan, S., Ito, S., and Ikeda, S., 2015, Effects of Porosity and Amounts of Surface Hydroxyl Groups of a Porous TiO₂ Layer on The Performance of a CH₃NH₃PbI₃ Perovskite Photovoltaic Cell, *J. Phys. Chem. C*, 119(39), 22304-22309.
- Baikie, T., Fang, Y., Kadro, J. M., Schreyer, M., Wei, F., Mhaisalkar, S. G., Graetzel, M., and White, T. J., 2013, Synthesis and Crystal Chemistry of The Hybrid Perovskite (CH₃NH₃)PbI₃ for Solid-State Sensitised Solar Cell Applications, *J. Mater. Chem. A*, 1(18), 5628-5641.
- Bi, C., Wang, Q., Shao, Y., Yuan, Y., Xiao, Z., and Huang, J., 2015, Non-Wetting Surface-Driven High-Aspect-Ratio Crystalline Grain Growth for Efficient Hybrid Perovskite Solar Cells, *Nat. Commun.*, 6, 1-7.
- Bi, D., Moon, S.J, Ha, L., Boschloo, G., Yang, L., Erik, M.J.J., Nazeeruddin, M.K., Grätzel, M., and Hagfeldt., 2013, Using a Two-Step Deposition Technique to Prepare Perovskite (CH₃NH₃PbI₃) for Thin Film Solar Cells Based on ZrO₂ and TiO₂ Mesostructures, *RSC Adv.*, 3(41), 18762-18766.
- Calió, L., Kazim, S., Grätzel, M., and Ahmad, S., 2016, Hole-Transport Materials for Perovskite Solar Cells, *Angew. Chem. Int. Ed.*, 55(47), 14522-14545.
- Chang, N.L., Ho-Baillie, A.W.Y., Basore, P.A., Young, T.L., Evan, R., and Egan, R.J., 2017, A Manufacturing Cost Estimation Method with Uncertainty Analysis and Its Application to Perovskite on Glass Photovoltaic Modules, *Prog. Photovolt. Res. Appl.*, 25(5), 390.
- Chauhan, A.K. and Kumar, P., 2017, Degradation in Perovskite Solar Cells Stored in Different Environmental Conditions, *J. Phys. D Appl. Phys.*, 50(32), 325105.
- Chen, L., Chen, C., Chen, J., and Wu, C., 2015, Annealing Effects on High-Performance CH₃NH₃PbI₃ Perovskite Solar Cells Prepared by Solution-Process, *Sol. Energy*, 122, 1047-1051.
- Chen, Q., De Marco, N., Yang, Y., Song, T.B., Chen, C.C., Zhao, H., Hong, Z., and Yang, Y., 2015, Under The Spotlight: The Organic-Inorganic Hybrid Halide Perovskite for Optoelectronic Applications, *Nano Today*, 10(3), 355-396.
- Choi, J., Song, S., Hörantner, M.T., Snaith, H.J., and Park, T., 2016, Well-Defined Nanostructured, Single-Crystalline TiO₂ Electron Transport Layer for Efficient Planar Perovskite Solar Cells, *ACS Nano*, 10(6), 6029-6036.
- Conings, B., Baeten, L., Dobbelaere, C.D., D'Haen, J., Manca, J., and Boyen, H.G., 2013, Perovskite-Based Hybrid Solar Cells Exceeding 10% Efficiency with High Reproducibility Using a Thin Film Sandwich Approach, *Adv. Mater.*, 26(13), 2041-2046.

- Dualeh, A., Tétreault, N., Moehl, T., and Gao, P., 2014, Effect of Annealing Temperature on Film Morphology of Organic–Inorganic Hybrid Perovskite Solid-State Solar Cells, *Adv. Funct. Mater.*, 24(21), 1–9.
- Eperon, G.E., Burlakov, V.M., Docampo, P., Goriely, A., and Snaith, H.J., 2013, Morphological Control for High Performance, Solution-Processed Planar Heterojunction Perovskite Solar Cells, *Adv. Funct. Mater.*, 24(1), 1–7.
- Escobar, M.A.M., Pathak, S., Liu, J., Snaith, H.J., and Jaramilo, F., 2016, ZrO₂/TiO₂ Electron Collection Layer for Efficient Meso-Superstructured Hybrid Perovskite Solar Cells, *ACS Appl. Mater. Interfaces*, 9, 2342–2349.
- Gamliel, S. and Etgar, L., 2014, Organo-Metal Perovskite Based Solar Cells: Sensitized versus Planar Architecture, *RSC Adv.*, 4(55), 29012–29021.
- Grätzel, M., 2014, The Light and Shade of Perovskite Solar Cells, *Nat. Mater.*, 13(9), 838–842.
- Guo, X., Mcclseese, C., Kolodziej, C., Samia, A.C.S., Zhao, Y., and Burda, C., 2016, Identification and Characterization of The Intermediate Phase in Hybrid Organic–Inorganic MAPbI₃ Perovskite, *Dalt. Trans.*, 45(9), 3806–3813.
- Han, G., Hadi, H. D., Bruno, A., Kulkarni, S. A., Koh, T. M., Wong, L. H., Soci, C., Mathews, N., Zhang, S., and Mhaisalkar, S. G., 2018, Additive Selection Strategy for High Performance Perovskite Photovoltaics, *J. Phys. Chem. C*, 122(25), 13884–13893.
- He, M., Zheng, D., Wang, M., Lin, C., and Lin, Z., 2013, High Efficiency Perovskite Solar Cells: From Complex Nanostructure to Planar Heterojunction, *J. Mater. Chem. A*, 2(17), 5994–6003.
- Herring, C., 1950, Effect of Change of Scale on Sintering Phenomena, *J. Appl. Phys.*, 21(4), 301–303.
- Hodes, G., 2013, Perovskite-Based Solar Cells, *Science*, 342(6156), 317–318.
- Huang, A., Zhu, J., Zheng, J., Yu, Y., Liu, Y., Yang, S., Bao, S., Lei, L., and Jin, P., 2016, Mesostructured Perovskite Solar Cells Based on Highly Ordered TiO₂ Network Scaffold via Anodization of Ti Thin Film, *Nanotechnology*, 28(5), 055403.
- Huang, Z., Wang, D., Wang, S., and Zhang, T., 2018, Highly Efficient and Stable MAPbI₃ Perovskite Solar Cell Induced by Regulated Nucleation and Ostwald Recrystallization, *Materials*, 11(5), 1–12.
- Hudaya, C., Park, J.H. and Lee, J.K., 2012, Effects of Process Parameters on Sheet Resistance Uniformity of Fluorine-doped Tin Oxide Thin Films, *Nanoscale Res. Lett.*, 7(17), 1–5.
- Im, J., Kim, H. and Park, N., 2014, Morphology-Photovoltaic Property Correlation in Perovskite Solar Cells: One-Step versus Two-Step Deposition of CH₃NH₃PbI₃, *APL Mater.*, 2(8), 1–8.

- Jeon, M.K., Ginting, R.T. and Kang, J.W., 2018, Impact of Short-Time Annealing of Methylammonium Lead Iodide on The Performance of Perovskite Solar Cells Prepared Under a High Humidity Condition, *Mol. Cryst. Liq. Cryst.*, 660(1), 79–84.
- Jiang, Q., Zhang, L., Wang, H., Yang, X., Meng, J., Liu, H., Yin, Z., Wu, J., Zhang, X., and You, J., 2017, Enhanced Electron Extraction Using SnO₂ for High-Efficiency Planar-Structure HC(NH₂)₂PbI₃-Based Perovskite Solar Cells, *Nat. Energy*, 2(16177), 1–7.
- Jiu, J., Isoda, S., Adachi, M., and Wang, F., 2007, Preparation of TiO₂ Nanocrystalline with 3-5 nm and Application for Dye-Sensitized Solar Cell, *J. Photochem. Photobiol. A Chem.*, 189, 314–321.
- Johansson, M.B., Edvinsson, T., Bitter, S., Eriksson, A.I.K., and Johansson, E.M.J., 2016, From Quantum Dots to Micro Crystals: Organolead Triiodide Perovskite Crystal Growth from Isopropanol Solution, *ECS J. Solid State Sci. Technol.*, 5(10), 614–620.
- Kartini, I., Menzies, D., Blake, D., Costa, C.D., Meredith, P., Riches, D., and Lu, G.Q., 2004, Hydrothermal Seeded Synthesis of Mesoporous Titania for Application in Dye-Sensitized Solar Cells (DSSCs), *J. Mater. Chem.*, 14(19), 2917–2921.
- Kato, Y., Ono, L.K., Lee, M.V., Wang, S., Raga, S.R., and Qi, Y., 2015, Perovskite Solar Cells: Silver Iodide Formation in Methyl Ammonium Lead Iodide Perovskite Solar Cells with Silver Top Electrodes, *Adv. Mater. Interfaces*, 2(13), 1500195.
- Kim, H.S., Lee, C.R., Im, J.H., Lee, K.B., Moehl, T., Marchioro, A., Moon, S.J., Humphry-Baker, R., Yum, J.H., Moser, J.E., Grätzel, M., and Park, N.G., 2012, Lead Iodide Perovskite Sensitized All-Solid-State Submicron Thin Film Mesoscopic Solar Cell with Efficiency Exceeding 9%, *Sci. Rep.*, 2, 1–7.
- Kojima, A., Teshima, K., Shirai, Y., and Miyasaka, T., 2009, Organometal Halide Perovskites as Visible-Light Sensitizers for Photovoltaic, *J. Am. Chem. Soc.*, 131, 6050–6051.
- Kwak, D.J., Moon, B.H., Park, C.S., and Sung, Y.M., 2011, Comparison of Transparent Conductive Indium Tin Oxide, Titanium-doped Indium Oxide, and Fluorine-doped Tin Oxide Films for Dye-Sensitized Solar Cell Application, *J. Electr. Eng. Technol.*, 6(5), 684–687.
- Lee, M.M., Miyasaka, T., Murakami, T.N., and Snaith, H.J., 2012, Efficient Hybrid Solar Cells Based on Meso-Superstructured Organometal Halide Perovskites, *Science*, 338(6107), 338, 643–647.
- Leijtens, T., Bush, K., Cheacharoen, R., Beal, R., Bowring, A., and McGehee, M. D., 2017, Towards Enabling Stable Lead Halide Perovskite Solar Cells; Interplay between Structural, Environmental and Thermal Stability, *J. Mater. Chem. A*, 5(23), 11483–11500.

- Leijtens, T., Lauber, B., Eperon, G.E., Stranks, S.D., and Snaith, H.J., 2014, The Importance of Perovskite Pore Filling in Organometal Mixed Halide Sensitized TiO₂-Based Solar Cells, *J. Phys. Chem. Lett.*, 5(7), 1096–1102.
- Li, H., Li, S., Wang, Y., Sarvari, H., Zhang, P., Wang, M., and Chen, Z., 2016, A Modified Sequential Deposition Method for Fabrication of Perovskite Solar Cells, *Sol. Energy*, 126, 243–251.
- Liang, Z., Zhang, S., Xu, X., Wang, N., Wang, J., Wang, X., Bi, Z., Xu, G., Yuan, N., and Ding, J., 2015, A Large Grain Size Perovskite Thin Film With a Dense Structure for Planar Heterojunction Solar Cells via Spray Deposition Under Ambient Conditions, *RSC Adv.*, 5(74), 60562–60569.
- Liu, F., Dong, Q., Wong, M.K., Djurišić, A.B., Ng, A., Ren, Z., Shen, Q., Surya, C., Chan, W.K., Ng, A.M.C., Liao, C., Li, H., Shih, K., Wei, C., Su, H., and Dai, J., 2016, Is Excess PbI₂ Beneficial for Perovskite Solar Cell Performance?, *Adv. Energy Mater.*, 6(7), 1–9.
- Liu, H., Huang, Z., Wei, S., Zheng, L., Xiao, L., and Gong, Q., 2016, Nano-Structured Electron Transporting Materials for Perovskite Solar Cells. *Nanoscale*, 8(12), 6209–6221.
- Lu, H., Deng, K., Yan, N., Ma, Y., Gu, B., Wang, Y., and Li, L., 2016, Efficient Perovskite Solar Cells Based on Novel Three-Dimensional TiO₂ Network Architectures, *Sci. Bull.*, 61(10), 778–786.
- Marchioro, A., Teucher, J., Friedrich, D., Kunst, M., van de Krol, R., Moehl, T., Grätzel, M., Moser, J.E., 2014, Unravelling The Mechanism of Photoinduced Charge Transfer Processes in Lead Iodide Perovskite Solar Cells, *Nat. Photonics*, 8, 250–255.
- Marinova, N., Valero, S. and Delgado, J.L., 2017, Organic and Perovskite Solar Cells: Working Principles, Materials and Interfaces, *J. Colloid Interface Sci.*, 488, 373–389.
- Mehmood, U., Rahman, S., Harrabi, K., Hussein, I.A., and Reddy, B.V.S., 2014, Recent Advances in Dye Sensitized Solar Cells, *Adv. Mater. Sci. Eng.*, 1-12.
- Noh, J.H., Jeon, N.J., Choi, Y.C., Nazeeruddin, M.K., Grätzel, M., and Seok, S.I., 2013, Nanostructured TiO₂/CH₃NH₃PbI₃ Heterojunction Solar Cells Employing Spiro-OMeTAD/Co-Complex as Hole-Transporting Material, *J. Mater. Chem. A*, 1(38), 11842–11847.
- Noh, M.F.M., Teh, C.H., Daik, R., Lim, E.L., Yap, C.C., Ibrahim, M.A., Ludin, N.A., Yusoff, A.R., Jang, J., and Teridi, M.A.M., 2018, The Architecture of The Electron Transport Layer for a Perovskite Solar Cell, *J. Mater. Chem. C*, 6(4), 682–712.
- Ozuomba, J.O., Okoli, L.U. and Ekpunobi, A.J., 2012, The Effect of Film Thickness and Sintering Temperature on The Electrical Performance of Carbon Electrode, *IJSTR*, 2(5), 276-280.

- Padchasri, J. and Yimnirun, R., 2017, Effects of Annealing Temperature on Stability of Methylammonium Lead Iodide Perovskite Powders, *J. Alloys Compd.*, 720, 63–69.
- Panwar, N.L., Kaushik, S.C. and Kothari, S., 2011, Role of Renewable Energy Sources in Environmental Protection: A Review, *Renew. Sustain. Energy Rev.*, 15(3), 1513–1524.
- Park, N., 2015, Perovskite Solar Cells: An Emerging Photovoltaic Technology, *Mater. Today*, 18(2), 65–72.
- Pawar, S.G., Chougule, M.A., Dalavi, D.S., Patil, P.S., Moholkar, A.V., Sen, S., Kim, J.H., and Patil, V.B., 2013, Effect of Annealing on Microstructural and Optoelectronic Properties of Nanocrystalline TiO₂ Thin Films, *J. Exp. Nanosci.*, 8(4), 500-508.
- Poglitsch, A. and Weber, D., 1987, Dynamic Disorder in Methylammonium-trihalogenoplumbates (II) Observed by Millimeter-Wave Spectroscopy, *J. Chem. Phys.*, 87(11), 6373–6378.
- Ramzan, M., Ahmed, E., Niaz, N.A., Rana, A.M., Bhatti, A.S., Khalid, N.R., and Nadeem, M.Y., 2015, AFM Applications to Study The Morphology of HfO₂ Multilayer Thin Films, *Superlattices Microstruct.*, 82, 399–405.
- Ren, X., Yang, Z., Yang, D., Zhang, X., Cui, D., Liu, Y., Wei, Q., Fan, H., and Liu, S., 2016, Modulating Crystal Grain Size and Optoelectronic Properties of Perovskite Films for Solar Cells by Reaction Temperature. *Nanoscale*, 8(6), 3816–3822.
- Salado, M., Cali6, L., Contreras-Bernal, L., Id6goras, J., Anta, J.A., Ahmad, S., and Kazim, S., 2018, Understanding The Influence of Interface Morphology on the Performance of Perovskite Solar Cells, *Materials*, 11(7), 1–13.
- Salim, T., Sun, S., Abe, Y., Krishna, A., Grimsdale, A.C., and Lam, Y.M., 2015, Perovskite-Based Solar Cells: Impact of Morphology and Device Architecture on Device Performance, *J. Mater. Chem. A*, 3(17), 8943–8969.
- Sari, N.T., 2018, Lapis Tipis Metilamoniumtimbal(II) Iodida pada TiO₂ dan Aplikasinya sebagai Sel Surya, *Skripsi*, Departemen Kimia FMIPA UGM, Yogyakarta.
- Schaffer J. P., Saxena A., Antolovich S. D., Sanders Jr, T. H., and Warner S. B., 1995, *The Science and Design of Engineering Materials*, 2nd edition, WCB/McGraw-Hill, Boston.
- Shalan, A.E., Narra, S., Oshikiri, T., Ueno, K., Shi, X., Wu, H.P., Elshanawany, M.M., Diau, E.W.G., and Misawa, H., 2017, Optimization of a Compact Layer of TiO₂ via Atomic-Layer Deposition for High-Performance Perovskite Solar Cells, *Sustain. Energy Fuels*, 1(7), 1533–1540.
- Shi, Z. and Jayatissa, A.H., 2018, Perovskites-Based Solar Cells: A Review of Recent Progress, Materials and Processing Methods, *Materials*, 11, 1–34.

- Sutthana, S., Hongsith, K., Ruankham, P., Wongratanphisan, D., Gardchareon, A., Phadungthitidhada, S., Boonyawan, D., Kumnorkaew, P., Tuantranont, A., and Choopun, S., 2017, Interface Modification of CH₃NH₃PbI₃/PCBM by Pre-Heat Treatment for Efficiency Enhancement of Perovskite Solar Cells, *Curr. Appl. Phys.*, 17(4), 488–494.
- Suzuki, A., Kato, M., Ueoka, N., and Oku, T., 2019, Additive Effect of Formamidinium Chloride in Methylammonium Lead Halide Compound-Based Perovskite Solar Cells, *J. Electron. Mater.*, 48(6), 3900–3907.
- Travis, W., Glover, E. N. K., Bronstein, H., Scanlon, D. O., and Palgrave, R. G., 2016, On The Application of The Tolerance Factor to Inorganic and Hybrid Halide Perovskites: A Revised System, *Chem. Sci.*, 7(7), 4548–4556.
- Uhl, A.R., 2018, *Metal Counter Electrodes for Perovskite Solar Cells*. Dalam Yun, S., and Hagfeldt, A., *Counter Electrodes for Dye-sensitized and Perovskite Solar Cells*, 2, Wiley-VCH, Weinheim.
- Umeyama, T. and Imahori, H., 2017, A Chemical Approach to Perovskite Solar Cells: Control of Electron-Transporting Mesoporous TiO₂ and Utilization of Nanocarbon Materials, *Dalt. Trans.*, 46(45), 15615-15627.
- Wang, X., Fang, Y., He, L., Wang, Q., and Wu, T., 2014, Influence of Compact TiO₂ Layer on The Photovoltaic Characteristics of The Organometal Halide Perovskite-Based Solar Cells, *Mater. Sci. Semicond. Process.*, 27, 569–576.
- Wei, H., Tang, Y., Feng, B., and You, H., 2017, Importance of PbI₂ Morphology in Two-Step Deposition of CH₃NH₃PbI₃ for High-Performance Perovskite Solar Cells, *Chin. Phys. B*, 26(12), 1-8.
- Wu, R., Yang, B., Xiong, J., Cao, C., Huang, Y., Wu, F., Sun, J., Huang, H., and Yang, J., 2015, Dependence of Device Performance on The Thickness of Compact TiO₂ Layer in Perovskite/TiO₂ Planar Heterojunction Solar Cells, *J. Renew. Sustain. Energy*, 7(4), 1–7.
- Wu, W.Q., Chen, D., Huang, F., Cheng, Y.B., and Caruso, R.A., 2016, Optimizing Semiconductor Thin Films with Smooth Surfaces and Well-Interconnected Networks for High-Performance Perovskite Solar Cells, *J. Mater. Chem. A*, 4(32), 12463-12470.
- Wu, Y., Islama, A., Yang, X., Qin, C., Liu, J., Zhang, K., Peng, W., and Han, L., 2014, Retarding The Crystallization of PbI₂ for Highly Reproducible Planar-Structured Perovskite Solar Cells via Sequential Deposition, *Energy Environ. Sci.*, 7(9), 2934-2938.
- Xiong, J., Yang, B., Cao, C., Wu, R., Huang, Y., Sun, J., Zhang, J., Liu, C., Tao, S., Gao, Y., Yang, J., 2016, Interface Degradation of Perovskite Solar Cells and Its Modification Using an Annealing-Free TiO₂ NPs Layer, *Org. Electron.*, 30, 30–35.
- Yamamoto, K., Yoshikawa, K., Uzu, H., and Adachi, D., 2018, High-Efficiency Heterojunction Crystalline Si Solar Cells, *Jpn. J. Appl. Phys.*, 57, 1-9.

- Yang, F., Zhang, P., Kamarudin, M.A., Kapil, G., Ma, T., and Hayase, S., 2018, Addition Effect of Pyreneammonium Iodide to Methylammonium Lead Halide Perovskite-2D/3D Heterostructured Perovskite with Enhanced Stability, *Adv. Funct. Mater.*, 28(46), 1–6.
- Yang, G., Tao, H., Qin, P., Ke, W., and Fang, G., 2016, Recent Progress in Electron Transport Layers for Efficient Perovskite Solar Cells, *J. Mater. Chem. A*, 4(11), 3970–3990.
- Yang, Z. and Zhang, W.H., 2014, Organolead Halide Perovskite: A Rising Player in High-Efficiency Solar Cells, *Chinese J. Catal.*, 35(7), 983–988.
- Yin, W., Pan, L., Yang, T., and Liang, Y., 2016, Recent Advances in Interface Engineering for Planar Heterojunction Perovskite Solar Cell., *Molecules*, 21(7), 1-18.
- You, J., Meng, L., Song, T. Bin, Guo, T.F., Chang, W.H., Hong, Z., Chen, H., Zhou, H., Chen, Q., Liu, Y., Marco, N.D., and Yang, Y., 2016, Improved Air Stability of Perovskite Solar Cells via Solution-Processed Metal Oxide Transport Layers, *Nat. Nanotechnol.*, 11, 75–81.
- Yu, Z. and Sun, L., 2015, Recent Progress on Hole-Transporting Materials for Emerging Organometal Halide Perovskite Solar Cells, *Adv. Energy Mater.*, 5(12), 1–17.
- Zhou, D., Zhou, T., Tian, Y., Zhu, X., and Tu, Y., 2018, Perovskite-Based Solar Cells: Materials, Methods, and Future Perspectives, *J. Nanomater.*, 1-15.
- Zukalová, M., Zukal, A., Kavan, L., Nazeeruddin, M.K., Liska, P., and Grätzel, M., 2005, Organized Mesoporous TiO₂ Films Exhibiting Greatly Enhanced Performance in Dye-Sensitized Solar Cells, *Nano Lett.*, 5(9), 1789–1792.
- Zuo, L., Gu, Z., Ye, T., Fu, W., Wu, G., Li, H., and Chen, H., 2015, Enhanced Photovoltaic Performance of CH₃NH₃PbI₃ Perovskite Solar Cells Through Interfacial Engineering Using Self-Assembling Monolayer, *J. Am. Chem. Soc.*, 137(7), 2674-2679.