REFERENCES

Ahmad, I., McCarthy, J.E., Bari, M., & Gun'ko, Y.K. (2014). Carbon nanomaterial based counter electrodes for dye sensitized solar cells. *Solar Energy, 102,* 152-161.

Archana, P.S., Naveen Kumar, E., Vijila, C., Ramakrishna, S., Yusoff, M.M., & Jose, R. (2013). Random nanowires of nickel doped TiO_2 with high surface area and electron mobility for high efficiency dye-sensitized solar cells. *Dalton Transactions, 42*(4), 1024-1032. doi: 10.1039/C2DT31775C

Armin, A., Velusamy, M., Wolfer, P., Zhang, Y., Burn, P.L., Meredith, P., & Pivrikas, A. (2014). Quantum efficiency of organic solar cells: Electro-optical cavity considerations. *ACS Photonics, 1*(3), 173-181. doi: 10.1021/ph400044k

Badia, L., Mas-Marzá, E., Sánchez, R.S., Barea, E.M., Bisquert, J., & Mora-Seró, I. (2014). New iridium complex as additive to the spiro-ometad in perovskite solar cells with enhanced stability. *APL Materials, 2*(8), 081507.

Ball, J.M., Lee, M.M., Hey, A., & Snaith, H.J. (2013). Low-temperature processed meso-superstructured to thin-film perovskite solar cells. *Energy & Environmental Science*, *6*(6), 1739-1743.

Bartesaghi, D., del Carmen Pérez, I., Kniepert, J., Roland, S., Turbiez, M., Neher, D., & Koster, L.J.A. (2015). Competition between recombination and extraction of free charges determines the fill factor of organic solar cells. *Nature communications, 6*.

Baruah, S., & Dutta, J. (2009). Hydrothermal growth of ZnO nanostructures. *Science and Technology of Advanced Materials, 10*(1), 013001.

Bavykin, D.V., Friedrich, J.M., & Walsh, F.C. (2006). Protonated titanates and TiO_2 nanostructured materials: Synthesis, properties, and applications. *Advanced Materials, 18*(21), 2807-2824.

Beard, M.C., Luther, J.M., & Nozik, A.J. (2014). The promise and challenge of nanostructured solar cells. *Nature nanotechnology, 9*(12), 951-954.

Berhe, S.A., Nag, S., Molinets, Z., & Youngblood, W.J. (2013). Influence of seeding and bath conditions in hydrothermal growth of very thin (~20 nm) single-crystalline rutile TiO_2 nanorod films. *ACS Applied Materials & Interfaces, 5*(4), 1181-1185. doi: 10.1021/am302315q

Bi, D., Boschloo, G., Schwarzmüller, S., Yang, L., Johansson, E.M., & Hagfeldt, A. (2013). Efficient and stable $CH_3NH_3PbI_3$-sensitized ZnO nanorod array solid-state solar cells. *Nanoscale, 5*(23), 11686-11691.

Bi, D., Yang, L., Boschloo, G., Hagfeldt, A., & Johansson, E.M. (2013). Effect of different hole transport materials on recombination in $CH_3NH_3PbI_3$ perovskite-sensitized mesoscopic solar cells. *The journal of physical chemistry letters, 4*(9), 1532-1536.

Bierman, M.J., & Jin, S. (2009). Potential applications of hierarchical branching nanowires in solar energy conversion. *Energy & Environmental Science, 2*(10), 1050-1059. doi: 10.1039/B912095E

Bird, R.E., Hulstrom, R.L., & Lewis, L. (1983). Terrestrial solar spectral data sets. *Solar energy, 30*(6), 563-573.

Bisquert, J. (2002). Theory of the impedance of electron diffusion and recombination in a thin layer. *The Journal of Physical Chemistry B, 106*(2), 325-333. doi: 10.1021/jp011941g

Bisquert, J., Zaban, A., Greenshtein, M., & Mora-Seró, I. (2004). Determination of rate constants for charge transfer and the distribution of semiconductor and electrolyte electronic energy levels in dye-sensitized solar cells by open-circuit photovoltage decay method. *Journal of the American Chemical Society, 126*(41), 13550-13559. doi: 10.1021/ja047311k

Blasco, J., García, J., Teresa, J.M.d., Ibarra, M.R., Algarabel, P.A., & Marquina, C. (1996). A systematic study of structural, magnetic and electrical properties of perovskites. *Journal of Physics: Condensed Matter, 8*(40), 7427.

Boix, P.P., Nonomura, K., Mathews, N., & Mhaisalkar, S.G. (2014). Current progress and future perspectives for organic/inorganic perovskite solar cells. *Materials Today, 17*(1), 16-23.

Boschloo, G., & Hagfeldt, A. (2009). Characteristics of the iodide/triiodide redox mediator in dye-sensitized solar cells. *Accounts of Chemical Research, 42*(11), 1819-1826.

Burschka, J., Pellet, N., Moon, S.-J., Humphry-Baker, R., Gao, P., Nazeeruddin, M.K., & Grätzel, M. (2013). Sequential deposition as a route to high-performance perovskite-sensitized solar cells. *Nature, 499*(7458), 316-319.

Burschka, J.A., Pellet, N., Nazeeruddin, M.K., Graetzel, M., & Ahmad, S. (2014). High performance perovskite-sensitized mesoscopic solar cells: Google Patents.

Chu, S., & Majumdar, A. (2012). Opportunities and challenges for a sustainable energy future. *Nature, 488*(7411), 294-303.

Cong, J., Yang, X., Kloo, L., & Sun, L. (2012). Iodine/iodide-free redox shuttles for liquid electrolyte-based dye-sensitized solar cells. *Energy & Environmental Science, 5*(11), 9180-9194.

Cui, J., Yuan, H., Li, J., Xu, X., Shen, Y., Lin, H., & Wang, M. (2016). Recent progress in efficient hybrid lead halide perovskite solar cells. *Science and Technology of Advanced Materials*.

Daeneke, T., Kwon, T.-H., Holmes, A.B., Duffy, N.W., Bach, U., & Spiccia, L. (2011). High-efficiency dye-sensitized solar cells with ferrocene-based electrolytes. *Nature chemistry, 3*(3), 211-215.

Darling, S.B., & You, F. (2013). The case for organic photovoltaics. *RSC Advances, 3*(39), 17633-17648. doi: 10.1039/C3RA42989J

De Angelis, F., Fantacci, S., Mosconi, E., Nazeeruddin, M.K., & Grätzel, M. (2011). Absorption spectra and excited state energy levels of the N719 dye on TiO_2 in dye-sensitized solar cell models. *The Journal of Physical Chemistry C, 115*(17), 8825-8831. doi: 10.1021/jp111949a

De Angelis, F., Fantacci, S., Selloni, A., Nazeeruddin, M.K., & Grätzel, M. (2010). First-principles modeling of the adsorption geometry and electronic structure of ru (ii) dyes on extended TiO_2 substrates for dye-sensitized solar cell applications. *The Journal of Physical Chemistry C, 114*(13), 6054-6061.

de Freitas, J.N., Nogueira, A.F., & De Paoli, M.-A. (2009). New insights into dye-sensitized solar cells with polymer electrolytes. *Journal of Materials Chemistry, 19*(30), 5279-5294.

De Wolf, S., Holovsky, J., Moon, S.-J., Löper, P., Niesen, B., Ledinsky, M., Haug, F.-J., Yum, J.-H., & Ballif, C. (2014). Organometallic halide perovskites: Sharp optical absorption edge and its relation to photovoltaic performance. *The journal of physical chemistry letters, 5*(6), 1035-1039.

Djurisic, A.B., Xi, Y.Y., Hsu, Y.F., & Chan, W.K. (2007). Hydrothermal synthesis of nanostructures. *Recent patents on nanotechnology, 1*(2), 121-128.

Dualeh, A., Moehl, T., Tetreault, N., Teuscher, J., Gao, P., Nazeeruddin, M.K., & Grätzel, M. (2013). Impedance spectroscopic analysis of lead iodide perovskite-sensitized solid-state solar cells. *ACS nano, 8*(1), 362-373.

Ecker, B., Egelhaaf, H.-J., Steim, R., Parisi, J., & von Hauff, E. (2012). Understanding s-shaped current–voltage characteristics in organic solar cells containing a tiox interlayer with impedance spectroscopy and equivalent circuit analysis. *The Journal of Physical Chemistry C, 116*(31), 16333-16337. doi: 10.1021/jp305206d

Elumalai, N.K., & Uddin, A. (2016). Open circuit voltage of organic solar cells: An in-depth review. *Energy & Environmental Science*.

Elumalai, N.K., Vijila, C., Jose, R., Zhi Ming, K., Saha, A., & Ramakrishna, S. (2013). Simultaneous improvements in power conversion efficiency and operational stability of polymer solar cells by interfacial engineering. *Physical Chemistry Chemical Physics, 15*(43), 19057-19064. doi: 10.1039/C3CP53352B

Eperon, G.E., Burlakov, V.M., Docampo, P., Goriely, A., & Snaith, H.J. (2014). Morphological control for high performance, solution-processed planar heterojunction perovskite solar cells. *Advanced Functional Materials, 24*(1), 151-157.

Even, J., Pedesseau, L., & Katan, C. (2014). Analysis of multivalley and multibandgap absorption and enhancement of free carriers related to exciton screening in hybrid perovskites. *The Journal of Physical Chemistry C, 118*(22), 11566-11572.

Fabregat-Santiago, F., Bisquert, J., Palomares, E., Otero, L., Kuang, D., Zakeeruddin, S.M., & Grätzel, M. (2007). Correlation between photovoltaic performance and impedance spectroscopy of dye-sensitized solar cells based on ionic liquids. *The Journal of Physical Chemistry C, 111*(17), 6550-6560. doi: 10.1021/jp066178a

Fabregat-Santiago, F., Garcia-Belmonte, G., Bisquert, J., Zaban, A., & Salvador, P. (2002). Decoupling of transport, charge storage, and interfacial charge transfer in the nanocrystalline TiO_2/electrolyte system by impedance methods. *The Journal of Physical Chemistry B, 106*(2), 334-339.

Fakharuddin, A., Ahmed, I., Khalidin, Z., Yusoff, M.M., & Jose, R. (2014). Channeling of electron transport to improve collection efficiency in mesoporous titanium dioxide dye sensitized solar cell stacks. *Applied Physics Letters*, *104*(5), 053905.

Fakharuddin, A., Di Giacomo, F., Ahmed, I., Wali, Q., Brown, T.M., & Jose, R. (2015). Role of morphology and crystallinity of nanorod and planar electron transport layers on the performance and long term durability of perovskite solar cells. *Journal of Power Sources*, *283*, 61-67.

Fakharuddin, A., Jose, R., Brown, T.M., Fabregat-Santiago, F., & Bisquert, J. (2014). A perspective on the production of dye-sensitized solar modules. *Energy & Environmental Science*, *7*(12), 3952-3981.

Fakharuddin, A., Palma, A.L., Di Giacomo, F., Casaluci, S., Matteocci, F., Wali, Q., Rauf, M., Di Carlo, A., Brown, T.M., & Jose, R. (2015). Solid state perovskite solar modules by vacuum-vapor assisted sequential deposition on Nd: YVO4 laser patterned rutile TiO_2 nanorods. *Nanotechnology, 26*(49), 494002.

Feng, X., Shankar, K., Varghese, O.K., Paulose, M., Latempa, T.J., & Grimes, C.A. (2008). Vertically aligned single crystal TiO_2 nanowire arrays grown directly on transparent conducting oxide coated glass: Synthesis details and applications. *Nano letters*, *8*(11), 3781-3786.

Ferber, J., Stangl, R., & Luther, J. (1998). An electrical model of the dye-sensitized solar cell. *Solar Energy Materials and Solar Cells*, *53*(1–2), 29-54. doi: http://dx.doi.org/10.1016/S0927-0248(98)00005-1

Gao, H., Bao, C., Li, F., Yu, T., Yang, J., Zhu, W., Zhou, X., Fu, G., & Zou, Z. (2015). Nucleation and crystal growth of organic–inorganic lead halide perovskites under different relative humidity. *ACS applied materials & interfaces*, *7*(17), 9110-9117.

Ghadiri, E., Taghavinia, N., Zakeeruddin, S.M., Grätzel, M., & Moser, J.-E. (2010). Enhanced electron collection efficiency in dye-sensitized solar cells based on nanostructured TiO_2 hollow fibers. *Nano letters*, *10*(5), 1632-1638.

Gonzalez-Pedro, V., Juarez-Perez, E.J., Arsyad, W.-S., Barea, E.M., Fabregat-Santiago, F., Mora-Sero, I., & Bisquert, J. (2014). General working principles of $CH_3NH_3PbI_3$ perovskite solar cells. *Nano letters, 14*(2), 888-893.

Goodhew, P.J., Humphreys, J., & Beanland, R. (2000). *Electron microscopy and analysis*: CRC Press.

Grätzel, M. (2001). Photoelectrochemical cells. *Nature*, *414*(6861), 338-344.

Grätzel, M. (2003). Dye-sensitized solar cells. *Journal of Photochemistry and Photobiology C: Photochemistry Reviews*, *4*(2), 145-153.

Grätzel, M. (2005). Solar energy conversion by dye-sensitized photovoltaic cells. *Inorganic Chemistry, 44*(20), 6841-6851. doi: 10.1021/ic0508371

Grätzel, M. (2014). The light and shade of perovskite solar cells. *Nature materials, 13*(9), 838-842.

Green, M.A., Emery, K., Hishikawa, Y., Warta, W., & Dunlop, E.D. (2015). Solar cell efficiency tables (version 45). *Progress in photovoltaics: research and applications, 23*(1), 1-9.

Green, M.A., Ho-Baillie, A., & Snaith, H.J. (2014). The emergence of perovskite solar cells. *Nature Photonics*, *8*(7), 506-514.

Guo, W., Xu, C., Wang, X., Wang, S., Pan, C., Lin, C., & Wang, Z.L. (2012). Rectangular bunched rutile tio2 nanorod arrays grown on carbon fiber for dye-sensitized solar cells. *Journal of the American Chemical Society, 134*(9), 4437-4441.

Habisreutinger, S.N., Leijtens, T., Eperon, G.E., Stranks, S.D., Nicholas, R.J., & Snaith, H.J. (2014). Carbon nanotube/polymer composites as a highly stable hole collection layer in perovskite solar cells. *Nano letters*, *14*(10), 5561-5568.

Hagfeldt, A., Boschloo, G., Sun, L., Kloo, L., & Pettersson, H. (2010). Dye-sensitized solar cells. *Chem. Rev., 110*(11), 6595-6663.

Hamad, H., El-latif, M.A., Kashyout, A.E.-H., Sadik, W., & Feteha, M. (2015). Optimizing the preparation parameters of mesoporous nanocrystalline titania and its photocatalytic activity in water: Physical properties and growth mechanisms. *Process Safety and Environmental Protection, 98,* 390-398.

Hara, K., Sato, T., Katoh, R., Furube, A., Ohga, Y., Shinpo, A., Suga, S., Sayama, K., Sugihara, H., & Arakawa, H. (2003). Molecular design of coumarin dyes for efficient dye-sensitized solar cells. *The Journal of Physical Chemistry B, 107*(2), 597-606.

Hendry, E., Wang, F., Shan, J., Heinz, T.F., & Bonn, M. (2004). Electron transport in TiO_2 probed by thz time-domain spectroscopy. *Physical Review B, 69*(8), 081101.

Heo, J.H., Im, S.H., Noh, J.H., Mandal, T.N., Lim, C.-S., Chang, J.A., Lee, Y.H., Kim, H.-j., Sarkar, A., & Nazeeruddin, M.K. (2013). Efficient inorganic-organic hybrid heterojunction solar cells containing perovskite compound and polymeric hole conductors. *Nature Photonics*, *7*(6), 486-491.

Heo, J.H., Song, D.H., Patil, B.R., & Im, S.H. (2015). Recent progress of innovative perovskite hybrid solar cells. *Israel Journal of Chemistry*, *55*(9), 966-977.

Hore, S., Vetter, C., Kern, R., Smit, H., & Hinsch, A. (2006). Influence of scattering layers on efficiency of dye-sensitized solar cells. *Solar Energy Materials and Solar Cells, 90*(9), 1176-1188.

Hoshikawa, T., Yamada, M., Kikuchi, R., & Eguchi, K. (2005). Impedance analysis of internal resistance affecting the photoelectrochemical performance of dye-sensitized solar cells. *Journal of the Electrochemical Society, 152*(2), E68-E73.

Hou, J.R. (2013). *Preparation of titania nanorod arrays by hydrothermal method.* Paper presented at the Advanced Materials Research.

Huang, F., Chen, D., Zhang, X.L., Caruso, R.A., & Cheng, Y.B. (2010). Dual-function scattering layer of submicrometer-sized mesoporous TiO_2 beads for high-efficiency dye-sensitized solar cells. *Advanced Functional Materials, 20*(8), 1301-1305.

Huber, B., Brodyanski, A., Scheib, M., Orendorz, A., Ziegler, C., & Gnaser, H. (2005). Nanocrystalline anatase TiO_2 thin films: Preparation and crystallite size-dependent properties. *Thin Solid Films, 472*(1), 114-124.

Ito, S., Murakami, T.N., Comte, P., Liska, P., Grätzel, C., Nazeeruddin, M.K., & Grätzel, M. (2008). Fabrication of thin film dye sensitized solar cells with solar to electric power conversion efficiency over 10%. *Thin solid films, 516*(14), 4613-4619.

J. Frank, A., Kopidakis, N., & Lagemaat, J.v.d. (2004). Electrons in nanostructured TiO_2 solar cells: Transport, recombination and photovoltaic properties. *Coordination Chemistry Reviews, 248*(13–14), 1165-1179.

Jeng, J.-Y., Chen, K.-C., Chiang, T.-Y., Lin, P.-Y., Tsai, T.-D., Chang, Y.-C., Guo, T.-F., Chen, P., Wen, T.-C., & Hsu, Y.-J. (2014). Nickel oxide electrode interlayer in $CH_3NH_3PbI_3$ perovskite/PCBM planar-heterojunction hybrid solar cells. *Advanced Materials, 26*(24), 4107-4113. doi: 10.1002/adma.201306217

Jeon, N.J., Noh, J.H., Yang, W.S., Kim, Y.C., Ryu, S., Seo, J., & Seok, S.I. (2015). Compositional engineering of perovskite materials for high-performance solar cells. *Nature, 517*(7535), 476-480.

Jin, C., Huailiang, Y., Junpeng, L., Xiaobao, X., Yan, S., Hong, L., & Mingkui, W. (2015). Recent progress in efficient hybrid lead halide perovskite solar cells. *Science and Technology of Advanced Materials, 16*(3), 036004.

Jose, R., Thavasi, V., & Ramakrishna, S. (2009). Metal oxides for dye-sensitized solar cells. *Journal of the American Ceramic Society, 92*(2), 289-301.

Kakiage, K., Aoyama, Y., Yano, T., Oya, K., Fujisawa, J.-i., & Hanaya, M. (2015). Highly-efficient dye-sensitized solar cells with collaborative sensitization by silyl-anchor and carboxy-anchor dyes. *Chemical Communications, 51*(88), 15894-15897.

Kamat, P.V. (2013). Evolution of perovskite photovoltaics and decrease in energy payback time. *J. Phys. Chem. Lett, 4*(21), 3733-3734.

Kashyout, A., Soliman, M., & Fathy, M. (2010). Effect of preparation parameters on the properties of TiO_2 nanoparticles for dye sensitized solar cells. *Renewable Energy, 35*(12), 2914-2920.

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. (2012). Lead iodide perovskite sensitized all-solid-state submicron thin film mesoscopic solar cell with efficiency exceeding 9%. *Scientific reports, 2*.

Kim, H.-S., Lee, J.-W., Yantara, N., Boix, P.-P., Kulkarni, S.-A., Mhaisalkar, S., Grätzel, M., & Park, N.-G. (2013). High efficiency solid-state sensitized solar cell-based on submicrometer rutile TiO_2 nanorod and $CH_3NH_3PbI_3$ perovskite sensitizer. *Nano Letters, 13*(6), 2412-2417. doi: 10.1021/nl400286w

Kim, H.-S., Mora-Sero, I., Gonzalez-Pedro, V., Fabregat-Santiago, F., Juarez-Perez, E.J., Park, N.-G., & Bisquert, J. (2013). Mechanism of carrier accumulation in perovskite thin-absorber solar cells. *Nat Commun, 4*. doi: 10.1038/ncomms3242

Kim, H.-S., & Park, N.-G. (2014). Parameters affecting i–v hysteresis of $CH_3NH_3PbI_3$ perovskite solar cells: Effects of perovskite crystal size and mesoporous TiO_2 layer. *The journal of physical chemistry letters, 5*(17), 2927-2934.

Kim, M.-S., Kim, B.-G., & Kim, J. (2009). Effective variables to control the fill factor of organic photovoltaic cells. *ACS Applied Materials & Interfaces, 1*(6), 1264-1269. doi: 10.1021/am900155y

Kojima, A., Teshima, K., Shirai, Y., & Miyasaka, T. (2009). Organometal halide perovskites as visible-light sensitizers for photovoltaic cells. *Journal of the American Chemical Society, 131*(17), 6050-6051.

Kroeze, J.E., Hirata, N., Schmidt-Mende, L., Orizu, C., Ogier, S.D., Carr, K., Grätzel, M., & Durrant, J.R. (2006). Parameters influencing charge separation in solid-state dye-sensitized solar cells using novel hole conductors. *Advanced Functional Materials, 16*(14), 1832-1838.

Kumar, A., Madaria, A.R., & Zhou, C. (2010). Growth of aligned single-crystalline rutile TiO_2 nanowires on arbitrary substrates and their application in dye-sensitized solar cells. *The Journal of Physical Chemistry C, 114*(17), 7787-7792.

Law, C., Miseikis, L., Dimitrov, S., Shakya-Tuladhar, P., Li, X., Barnes, P.R., Durrant, J., & O'Regan, B.C. (2014). Performance and stability of lead perovskite/TiO_2, polymer/pcbm, and dye sensitized solar cells at light intensities up to 70 suns. *Advanced Materials, 26*(36), 6268-6273.

Lee, B.H., Song, M.Y., Jang, S.-Y., Jo, S.M., Kwak, S.-Y., & Kim, D.Y. (2009). Charge transport characteristics of high efficiency dye-sensitized solar cells based on electrospun TiO_2 nanorod photoelectrodes. *The Journal of Physical Chemistry C, 113*(51), 21453-21457. doi: 10.1021/jp907855x

Lee, M.M., Teuscher, J., Miyasaka, T., Murakami, T.N., & Snaith, H.J. (2012). Efficient hybrid solar cells based on meso-superstructured organometal halide perovskites. *Science, 338*(6107), 643-647.

Li, D., Qin, D., Deng, M., Luo, Y., & Meng, Q. (2009). Optimization the solid-state electrolytes for dye-sensitized solar cells. *Energy & Environmental Science, 2*(3), 283-291.

Li, Y., Zhang, M., Guo, M., & Wang, X. (2010). Hydrothermal growth of well-aligned tio2 nanorod arrays: Dependence of morphology upon hydrothermal reaction conditions. *Rare metals, 29*(3), 286-291.

Listorti, A., O'Regan, B., & Durrant, J.R. (2011). Electron transfer dynamics in dye-sensitized solar cells. *Chemistry of Materials, 23*(15), 3381-3399.

Liu, B., & Aydil, E.S. (2009). Growth of oriented single-crystalline rutile TiO_2 nanorods on transparent conducting substrates for dye-sensitized solar cells. *Journal of the American Chemical Society, 131*(11), 3985-3990.

Liu, M., Johnston, M.B., & Snaith, H.J. (2013). Efficient planar heterojunction perovskite solar cells by vapour deposition. *Nature, 501*(7467), 395-398.

Lu, K. (2014). *Materials in energy conversion, harvesting, and storage*: John Wiley & Sons.

Lv, M., Zheng, D., Ye, M., Xiao, J., Guo, W., Lai, Y., Sun, L., Lin, C., & Zuo, J. (2013). Optimized porous rutile TiO_2 nanorod arrays for enhancing the efficiency of dye-sensitized solar cells. *Energy & Environmental Science, 6*(5), 1615-1622.

Ma, T., Fang, X., Akiyama, M., Inoue, K., Noma, H., & Abe, E. (2004). Properties of several types of novel counter electrodes for dye-sensitized solar cells. *Journal of Electroanalytical Chemistry, 574*(1), 77-83.

Maçaira, J., Andrade, L., & Mendes, A. (2013). Review on nanostructured photoelectrodes for next generation dye-sensitized solar cells. *Renewable and Sustainable Energy Reviews, 27*, 334-349. doi: http://dx.doi.org/10.1016/j.rser.2013.07.011

Martínez-Ferrero, E., Albero, J., & Palomares, E. (2010). Materials, nanomorphology, and interfacial charge transfer reactions in quantum dot/polymer solar cell devices. *The Journal of Physical Chemistry Letters, 1*(20), 3039-3045. doi: 10.1021/jz101228z

Mathew, S., Yella, A., Gao, P., Humphry-Baker, R., Curchod, B.F., Ashari-Astani, N., Tavernelli, I., Rothlisberger, U., Nazeeruddin, M.K., & Grätzel, M. (2014). Dye-sensitized solar cells with 13% efficiency achieved through the molecular engineering of porphyrin sensitizers. *Nature chemistry, 6*(3), 242-247.

Matteocci, F., Cinà, L., Di Giacomo, F., Razza, S., Palma, A.L., Guidobaldi, A., D'Epifanio, A., Licoccia, S., Brown, T.M., & Reale, A. (2014). High efficiency photovoltaic module based on mesoscopic organometal halide perovskite. *Progress in Photovoltaics: Research and Applications*.

Matteocci, F., Razza, S., Di Giacomo, F., Casaluci, S., Mincuzzi, G., Brown, T., D'Epifanio, A., Licoccia, S., & Di Carlo, A. (2014). Solid-state solar modules based on mesoscopic organometal halide perovskite: A route towards the up-scaling process. *Physical Chemistry Chemical Physics*, *16*(9), 3918-3923.

McCusker, L., & Baerlocher, C. (2013). Electron crystallography as a complement to x-ray powder diffraction techniques. *Zeitschrift für Kristallographie-Crystalline Materials, 228*(1), 1-10.

Mei, A., Li, X., Liu, L., Ku, Z., Liu, T., Rong, Y., Xu, M., Hu, M., Chen, J., & Yang, Y. (2014). A hole-conductor–free, fully printable mesoscopic perovskite solar cell with high stability. *Science, 345*(6194), 295-298.

Mitzi, D.B. (2007). Synthesis, structure, and properties of organic-inorganic perovskites and related materials. *Progress in Inorganic Chemistry, Volume 48*, 1-121.

Mohammad, N., Quamruzzaman, M., Hossain, M.R.T., & Alam, M.R. (2013). Parasitic effects on the performance of dc-dc sepic in photovoltaic maximum power point tracking applications.

Moser, J. (1887). Notiz über verstärkung photoelektrischer ströme durch optische sensibilisirung. *Monatshefte für Chemie/Chemical Monthly, 8*(1), 373-373.

Murakami, T.N., Ito, S., Wang, Q., Nazeeruddin, M.K., Bessho, T., Cesar, I., Liska, P., Humphry-Baker, R., Comte, P., & Péchy, P. (2006). Highly efficient dye-sensitized solar cells based on carbon black counter electrodes. *Journal of the Electrochemical Society, 153*(12), A2255-A2261.

Murray, A.T., Frost, J.M., Hendon, C.H., Molloy, C.D., Carbery, D.R., & Walsh, A. (2015). Modular design of spiro-ometad analogues as hole transport materials in solar cells. *Chemical Communications, 51*(43), 8935-8938.

Nazeeruddin, M.K., De Angelis, F., Fantacci, S., Selloni, A., Viscardi, G., Liska, P., Ito, S., Takeru, B., & Grätzel, M. (2005). Combined experimental and dft-tddft computational study of photoelectrochemical cell ruthenium sensitizers. *Journal of the American Chemical Society, 127*(48), 16835-16847.

Nazeeruddin, M.K., Humphry-Baker, R., Liska, P., & Grätzel, M. (2003). Investigation of sensitizer adsorption and the influence of protons on current and voltage of a dye-sensitized nanocrystalline TiO_2 solar cell. *The Journal of Physical Chemistry B, 107*(34), 8981-8987.

Nazeeruddin, M.K., Zakeeruddin, S., Lagref, J.-J., Liska, P., Comte, P., Barolo, C., Viscardi, G., Schenk, K., & Grätzel, M. (2004). Stepwise assembly of amphiphilic ruthenium sensitizers and their applications in dye-sensitized solar cell. *Coordination chemistry reviews, 248*(13), 1317-1328.

Niu, G., Li, W., Meng, F., Wang, L., Dong, H., & Qiu, Y. (2014). Study on the stability of $CH_3NH_3PbI_3$ films and the effect of post-modification by aluminum oxide in all-solid-state hybrid solar cells. *Journal of Materials Chemistry A, 2*(3), 705-710.

Noh, S.I., Ahn, H.-J., & Riu, D.-H. (2012). Photovoltaic property dependence of dye-sensitized solar cells on sheet resistance of fto substrate deposited via spray pyrolysis. *Ceramics International, 38*(5), 3735-3739.

O'regan, B., & Grfitzeli, M. (1991). A low-cost, high-efficiency solar cell based on dye-sensitized. *nature, 353*(6346), 737-740.

Ogomi, Y., Kukihara, K., Qing, S., Toyoda, T., Yoshino, K., Pandey, S., Momose, H., & Hayase, S. (2014). Control of charge dynamics through a charge-separation interface for all-solid perovskite-sensitized solar cells. *ChemPhysChem, 15*(6), 1062-1069.

Park, N.-G. (2013). Organometal perovskite light absorbers toward a 20% efficiency low-cost solid-state mesoscopic solar cell. *The Journal of Physical Chemistry Letters, 4*(15), 2423-2429.

Park, N.-G., Van de Lagemaat, J., & Frank, A. (2000). Comparison of dye-sensitized rutile-and anatase-based TiO_2 solar cells. *The Journal of Physical Chemistry B, 104*(38), 8989-8994.

Perkampus, H.-H., Grinter, H.-C., & Threlfall, T. (1992). *Uv-vis spectroscopy and its applications*: Springer.

Pitarch, Á., Garcia-Belmonte, G., Mora-Seró, I., & Bisquert, J. (2004). Electrochemical impedance spectra for the complete equivalent circuit of diffusion and reaction under steady-state recombination current. *Physical Chemistry Chemical Physics, 6*(11), 2983-2988.

Polman, A., Knight, M., Garnett, E.C., Ehrler, B., & Sinke, W.C. (2016). Photovoltaic materials: Present efficiencies and future challenges. *Science, 352*(6283). doi: 10.1126/science.aad4424

Pottier, A., Chanéac, C., Tronc, E., Mazerolles, L., & Jolivet, J.-P. (2001). Synthesis of brookite TiO_2 nanoparticles by thermolysis of $TiCl_4$ in strongly acidic aqueous media. *Journal of Materials Chemistry, 11*(4), 1116-1121.

Privalov, T., Boschloo, G., Hagfeldt, A., Svensson, P.H., & Kloo, L. (2008). A study of the interactions between i−/i3− redox mediators and organometallic sensitizing dyes in solar cells. *The Journal of Physical Chemistry C, 113*(2), 783-790.

Qiu, J., Qiu, Y., Yan, K., Zhong, M., Mu, C., Yan, H., & Yang, S. (2013). All-solid-state hybrid solar cells based on a new organometal halide perovskite sensitizer and one-dimensional TiO_2 nanowire arrays. *Nanoscale, 5*(8), 3245-3248.

Qu, J., Li, G.R., & Gao, X.P. (2010). One-dimensional hierarchical titania for fast reaction kinetics of photoanode materials of dye-sensitized solar cells. *Energy & Environmental Science, 3*(12), 2003-2009. doi: 10.1039/C003646C

Reese, M.O., Gevorgyan, S.A., Jørgensen, M., Bundgaard, E., Kurtz, S.R., Ginley, D.S., Olson, D.C., Lloyd, M.T., Morvillo, P., & Katz, E.A. (2011). Consensus stability testing protocols for organic photovoltaic materials and devices. *Solar Energy Materials and Solar Cells, 95*(5), 1253-1267.

Robertson, N. (2006). Optimizing dyes for dye-sensitized solar cells. *Angewandte Chemie International Edition, 45*(15), 2338-2345.

Saito, M., & Fujihara, S. (2008). Large photocurrent generation in dye-sensitized ZnO solar cells. *Energy & Environmental Science, 1*(2), 280-283.

Saliba, M., Orlandi, S., Matsui, T., Aghazada, S., Cavazzini, M., Correa-Baena, J.-P., Gao, P., Scopelliti, R., Mosconi, E., & Dahmen, K.-H. (2016a). A molecularly engineered hole-transporting material for efficient perovskite solar cells. *Nature Energy, 1*, 15017.

Saliba, M., Orlandi, S., Matsui, T., Aghazada, S., Cavazzini, M., Correa-Baena, J.-P., Gao, P., Scopelliti, R., Mosconi, E., & Dahmen, K.-H. (2016b). A molecularly engineered hole-transporting material for efficient perovskite solar cells. *Nature Energy*, 15017.

Schmidt-Mende, L., & Grätzel, M. (2006). TiO_2 pore-filling and its effect on the efficiency of solid-state dye-sensitized solar cells. *Thin Solid Films, 500*(1), 296-301.

Schulz, P., Edri, E., Kirmayer, S., Hodes, G., Cahen, D., & Kahn, A. (2014). Interface energetics in organo-metal halide perovskite-based photovoltaic cells. *Energy &Environmental Science, 7*(4), 1377-1381. doi: 10.1039/C4EE00168K

Shao, Y., Xiao, Z., Bi, C., Yuan, Y., & Huang, J. (2014). Origin and elimination of photocurrent hysteresis by fullerene passivation in $CH_3NH_3PbI_3$ planar heterojunction solar cells. *Nature communications, 5*.

Shen, Q., Ogomi, Y., Chang, J., Toyoda, T., Fujiwara, K., Yoshino, K., Sato, K., Yamazaki, K., Akimoto, M., Kuga, Y., Katayama, K., & Hayase, S. (2015). Optical absorption, charge separation and recombination dynamics in Sn/Pb cocktail perovskite solar cells and their relationships to photovoltaic performances. *Journal of Materials Chemistry A, 3*(17), 9308-9316. doi: 10.1039/C5TA01246E

Singh, J., Gusain, A., Saxena, V., Chauhan, A.K., Veerender, P., Koiry, S.P., Jha, P., Jain, A., Aswal, D.K., & Gupta, S.K. (2013). XPS, UV–Vis, FTIR, and EXAFS studies to investigate the binding mechanism of N719 dye onto oxalic acid treated TiO_2 and its implication on photovoltaic properties. *The Journal of Physical Chemistry C, 117*(41), 21096-21104. doi: 10.1021/jp4062994

Sivakumar, R., Ramkumar, J., Shaji, S., & Paulraj, M. (2016). Efficient TiO_2 blocking layer for TiO_2 nanorod arrays-based dye-sensitized solar cells. *Thin Solid Films, 615*, 171-176.

Snaith, H.J. (2013). Perovskites: The emergence of a new era for low-cost, high-efficiency solar cells. *The Journal of Physical Chemistry Letters, 4*(21), 3623-3630.

Snaith, H.J., Abate, A., Ball, J.M., Eperon, G.E., Leijtens, T., Noel, N.K., Stranks, S.D., Wang, J.T.-W., Wojciechowski, K., & Zhang, W. (2014). Anomalous hysteresis in perovskite solar cells. *The journal of physical chemistry letters, 5*(9), 1511-1515.

Snaith, H.J., Humphry-Baker, R., Chen, P., Cesar, I., Zakeeruddin, S.M., & Grätzel, M. (2008). Charge collection and pore filling in solid-state dye-sensitized solar cells. *Nanotechnology, 19*(42), 424003.

Snaith, H.J., & Schmidt-Mende, L. (2007). Advances in liquid-electrolyte and solid-state dye-sensitized solar cells. *Advanced Materials, 19*(20), 3187-3200.

Sommeling, P., O'regan, B., Haswell, R., Smit, H., Bakker, N., Smits, J., Kroon, J., & Van Roosmalen, J. (2006). Influence of a $TiCl_4$ post-treatment on nanocrystalline TiO_2 films in dye-sensitized solar cells. *The Journal of Physical Chemistry B, 110*(39), 19191-19197.

Su, J., Feng, X., Sloppy, J.D., Guo, L., & Grimes, C.A. (2010). Vertically aligned wo3 nanowire arrays grown directly on transparent conducting oxide coated glass: Synthesis and photoelectrochemical properties. *Nano letters, 11*(1), 203-208.

Sun, P., Zhang, X., Liu, X., Wang, L., Wang, C., Yang, J., & Liu, Y. (2012). Growth of single-crystalline rutile TiO_2 nanowire array on titanate nanosheet film for dye-sensitized solar cells. *Journal of Materials Chemistry, 22*(13), 6389-6393.

Suryanarayana, C., & Norton, M.G. (2013). *X-ray diffraction: A practical approach*: Springer Science & Business Media.

Tavakoli, A., Sohrabi, M., & Kargari, A. (2007). A review of methods for synthesis of nanostructured metals with emphasis on iron compounds. *Chemical Papers, 61*(3), 151-170.

Tiwana, P., Docampo, P., Johnston, M.B., Snaith, H.J., & Herz, L.M. (2011). Electron mobility and injection dynamics in mesoporous ZnO, SnO_2, and TiO_2 films used in dye-sensitized solar cells. *ACS nano, 5*(6), 5158-5166.

Toivola, M., Ahlskog, F., & Lund, P. (2006). Industrial sheet metals for nanocrystalline dye-sensitized solar cell structures. *Solar energy materials and solar cells, 90*(17), 2881-2893.

Vesce, L., Riccitelli, R., Soscia, G., Brown, T.M., Di Carlo, A., & Reale, A. (2010). Optimization of nanostructured titania photoanodes for dye-sensitized solar cells: Study and experimentation of ticl 4 treatment. *Journal of Non-crystalline solids, 356*(37), 1958-1961.

Vincent, B., Robertson, K., Cameron, T., & Knop, O. (1986). Isolated PbI_6 4-ions in (CH_3NH_3) $4PbI_6 \cdot 2H_2O$. *Can. J. Chem, 65*, 1042-1046.

Vogel, R., Hoyer, P., & Weller, H. (1994). Quantum-sized PbS, CdS, Ag_2S, Sb_2S_3, and Bi_2S_3 particles as sensitizers for various nanoporous wide-bandgap semiconductors. *The Journal of Physical Chemistry, 98*(12), 3183-3188.

Vougioukalakis, G.C., Konstantakou, M., Pefkianakis, E.K., Kabanakis, A.N., Stergiopoulos, T., Kontos, A.G., Andreopoulou, A.K., Kallitsis, J.K., & Falaras, P. (2014). A ruthenium-based light-harvesting antenna bearing an anthracene moiety in dye-sensitized solar cells. *Asian Journal of Organic Chemistry, 3*(9), 953-962.

Vougioukalakis, G.C., Philippopoulos, A.I., Stergiopoulos, T., & Falaras, P. (2011). Contributions to the development of ruthenium-based sensitizers for dye-sensitized solar cells. *Coordination Chemistry Reviews, 255*(21), 2602-2621.

Wang, H.-E., Chen, Z., Leung, Y.H., Luan, C., Liu, C., Tang, Y., Yan, C., Zhang, W., Zapien, J.A., & Bello, I. (2010). Hydrothermal synthesis of ordered single-crystalline rutile TiO_2 nanorod arrays on different substrates. *Applied Physics Letters, 96*(26), 263104.

Wang, H.E., Chen, Z., Leung, Y.H., Luan, C., Liu, C., Tang, Y., Yan, C., Zhang, W., Zapien, J.A., Bello, I., & Lee, S.T. (2010). Hydrothermal synthesis of ordered single-crystalline rutile TiO_2 nanorod arrays on different substrates. *Applied Physics Letters, 96*(26).

Wang, J., & Lin, Z. (2012). Dye-sensitized TiO_2 nanotube solar cells: Rational structural and surface engineering on TiO_2 nanotubes. *Chemistry–An Asian Journal, 7*(12), 2754-2762.

Wang, K.-C., Jeng, J.-Y., Shen, P.-S., Chang, Y.-C., Diau, E.W.-G., Tsai, C.-H., Chao, T.-Y., Hsu, H.-C., Lin, P.-Y., & Chen, P. (2014). P-type mesoscopic nickel oxide/organometallic perovskite heterojunction solar cells. *Scientific reports, 4*.

Wang, M., Grätzel, C., Zakeeruddin, S.M., & Grätzel, M. (2012). Recent developments in redox electrolytes for dye-sensitized solar cells. *Energy & Environmental Science, 5*(11), 9394-9405.

Wang, Q., Ito, S., Grätzel, M., Fabregat-Santiago, F., Mora-Sero, I., Bisquert, J., Bessho, T., & Imai, H. (2006). Characteristics of high efficiency dye-sensitized solar cells. *The Journal of Physical Chemistry B, 110*(50), 25210-25221.

Wang, X., He, G., Fong, H., & Zhu, Z. (2013). Electron transport and recombination in photoanode of electrospun tio2 nanotubes for dye-sensitized solar cells. *The Journal of Physical Chemistry C, 117*(4), 1641-1646.

Wang, X., Kulkarni, S.A., Ito, B.I., Batabyal, S.K., Nonomura, K., Wong, C.C., Grätzel, M., Mhaisalkar, S.G., & Uchida, S. (2012). Nanoclay gelation approach toward improved dye-sensitized solar cell efficiencies: An investigation of charge transport and shift in the TiO_2 conduction band. *ACS applied materials & interfaces, 5*(2), 444-450.

Wang, Z.-S., Kawauchi, H., Kashima, T., & Arakawa, H. (2004). Significant influence of TiO_2 photoelectrode morphology on the energy conversion efficiency of n719 dye-sensitized solar cell. *Coordination Chemistry Reviews, 248*(13–14), 1381-1389. doi: http://dx.doi.org/10.1016/j.ccr.2004.03.006

Wei, D. (2010). Dye sensitized solar cells. *International journal of molecular sciences, 11*(3), 1103-1113.

Wu, J.-J., & Yu, C.-C. (2004). Aligned TiO_2 nanorods and nanowalls. *The Journal of Physical Chemistry B, 108*(11), 3377-3379. doi: 10.1021/jp0361935

Wu, J., Lan, Z., Lin, J., Huang, M., Huang, Y., Fan, L., & Luo, G. (2015). Electrolytes in dye-sensitized solar cells. *Chemical Reviews, 115*(5), 2136-2173.

Xie, P., & Guo, F. (2007). Molecular engineering of ruthenium sensitizers in dye-sensitized solar cells. *Current Organic Chemistry, 11*(14), 1272-1286.

Xing, G., Mathews, N., Sun, S., Lim, S.S., Lam, Y.M., Grätzel, M., Mhaisalkar, S., & Sum, T.C. (2013). Long-range balanced electron-and hole-transport lengths in organic-inorganic $CH_3NH_3PbI_3$. *Science, 342*(6156), 344-347.

Yang, W.S., Noh, J.H., Jeon, N.J., Kim, Y.C., Ryu, S., Seo, J., & Seok, S.I. (2015). High-performance photovoltaic perovskite layers fabricated through intramolecular exchange. *Science, 348*(6240), 1234-1237.

Yang, X., Yanagida, M., & Han, L. (2013). Reliable evaluation of dye-sensitized solar cells. *Energy & Environmental Science, 6*(1), 54-66. doi: 10.1039/C2EE22998F

Ye, M., Chen, C., Lv, M., Zheng, D., Guo, W., & Lin, C. (2013). Facile and effective synthesis of hierarchical tio 2 spheres for efficient dye-sensitized solar cells. *Nanoscale, 5*(14), 6577-6583.

Ye, M., Wen, X., Wang, M., Iocozzia, J., Zhang, N., Lin, C., & Lin, Z. (2015). Recent advances in dye-sensitized solar cells: From photoanodes, sensitizers and electrolytes to counter electrodes. *Materials Today, 18*(3), 155-162.

Ye, M., Zheng, D., Lv, M., Chen, C., Lin, C., & Lin, Z. (2013). Hierarchically structured nanotubes for highly efficient dye-sensitized solar cells. *Advanced Materials, 25*(22), 3039-3044.

Yella, A., Heiniger, L.-P., Gao, P., Nazeeruddin, M.K., & Grätzel, M. (2014). Nanocrystalline rutile electron extraction layer enables low-temperature solution processed perovskite photovoltaics with 13.7% efficiency. *Nano letters, 14*(5), 2591-2596.

Yella, A., Lee, H.-W., Tsao, H.N., Yi, C., Chandiran, A.K., Nazeeruddin, M.K., Diau, E.W.-G., Yeh, C.-Y., Zakeeruddin, S.M., & Grätzel, M. (2011). Porphyrin-sensitized solar cells with cobalt (ii/iii)–based redox electrolyte exceed 12 percent efficiency. *science, 334*(6056), 629-634.

Yu, Y., Li, J., Geng, D., Wang, J., Zhang, L., Andrew, T.L., Arnold, M.S., & Wang, X. (2015). Development of lead iodide perovskite solar cells using three-dimensional titanium dioxide nanowire architectures. *ACS nano, 9*(1), 564-572.

Zhang, Q., & Cao, G. (2011). Nanostructured photoelectrodes for dye-sensitized solar cells. *Nano Today, 6*(1), 91-109.