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2023

Recent Advances in Ultralow-Pt-Loading Electrocatalysts for the Efficient Hydrogen Evolution.

Guo F, Macdonald TJ, Sobrido AJ, Liu L, Feng J and He G. *Advanced Science*. Wiley Open Access.

2022

Halide Chemistry in Tin Perovskite Optoelectronics: Bottlenecks and Opportunities.

Lanzetta L, Webb T, Marin Beloqui JM, Macdonald TJ and Haque SA. *Angewandte Chemie* vol. 135, (8). Wiley.

Engineering Stable Lead-free Tin Halide Perovskite Solar Cells: Lessons from Materials Chemistry.

Macdonald TJ, Lanzetta L, Liang X, Ding D and Haque SA. *Advanced Materials* e2206684-e2206684. Wiley.

Deciphering the Role of Hole Transport Layer HOMO Level on the Open Circuit Voltage of Perovskite Solar Cells.

Jiang Z, Du T, Lin C, Macdonald TJ, Chen J, Chin Y, Xu W, Ding B, Kim J, Durrant JR, Heeney M and McLachlan MA. *Advanced Materials Interfaces* vol. 10, (19). Wiley.

Phosphorene nanoribbons for next-generation energy devices.

Macdonald TJ, Clancy AJ, Shutt RRC and Howard CA. *Joule*. Elsevier.

Tuning Halide Composition Allows Low Dark Current Perovskite Photodetectors With High Specific Detectivity.

Furlan F, Nodari D, Palladino E, Angela E, Mohan L, Briscoe J, Fuchter MJ, Macdonald TJ, Grancini G, McLachlan MA and Gasparini N. *Advanced Optical Materials*. Wiley.

Water-Insensitive Electron Transport and Photoactive Layers for Improved Underwater Stability of Organic Photovoltaics (Adv. Funct. Mater. 40/2022).

Lin C, Hsieh C, Macdonald TJ, Chang J, Lin P, Cha H, Steier L, Wadsworth A, McCulloch I, Chueh C and Durrant JR. *Advanced Functional Materials* vol. 32, (40) 2270223-2270223. Wiley.

Hydrogen-Bond Reinforced Superstructural Manganese Oxide As the Cathode for Ultra-Stable Aqueous Zinc Ion Batteries.

Li J, Luo N, Kang L, Zhao F, Jiao Y, Macdonald TJ, Wang M, Parkin IP, Shearing PR, Brett DJL, Chai G and He G. *Advanced Energy Materials*. Wiley-Vch Verlag.

Water-Insensitive Electron Transport and Photoactive Layers for Improved Underwater Stability of Organic Photovoltaics.

Lin CT, Hsieh CT, Macdonald TJ, Chang JF, Lin PC, Cha H, Steier L, Wadsworth A, McCulloch I, Chueh CC and Durrant JR. *Advanced Functional Materials*.

A Multifaceted Ferrocene Interlayer for Highly Stable and Efficient Lithium Doped SpiroOMeTAD-based Perovskite Solar Cells.

Webb T, Liu X, Westbrook RJE, Kern S, Sajjad MT, Jenatsch S, Jayawardena KDGI, Perera WHK, Marko IP, Sathasivam S, Li B, Yavari M, Scurr DJ, Alexander MR, Macdonald TJ, Haque SA, Sweeney SJ and Zhang W. *Advanced Energy Materials* vol. 12, (26) 2200666-2200666. Wiley-Vch Verlag.

Asymmetric charge carrier transfer and transport in planar lead halide perovskite solar cells.

Xu W, Du T, Sachs M, Macdonald TJ, Min G, Mohan L, Stewart K, Lin C-T, Wu J, Pacalaj R, Haque SA, McLachlan MA and Durrant JR. *Cell Reports Physical Science* vol. 3, (5).Elsevier.

Overcoming Nanoscale Inhomogeneities in Thin-Film Perovskites via Exceptional Post-annealing Grain Growth for Enhanced Photodetection.

Du T, Richheimer F, Frohna K, Gasparini N, Mohan L, Min G, Xu W, Macdonald TJ, Yuan H, Ratnasingham SR, Haque S, Castro FA, Durrant JR, Stranks SD, Wood S, McLachlan MA and Briscoe J. *Nano Letters* vol. 22, (3) 979-988.American Chemical Society (Acs).

2021

Phosphorene Nanoribbon-Augmented Optoelectronics for Enhanced Hole Extraction.

Macdonald TJ, Clancy AJ, Xu W, Jiang Z, Lin C-T, Mohan L, Du T, Tune DD, Lanzetta L, Min G, Webb T, Ashoka A, Pandya R, Tileli V, McLachlan MA, Durrant JR, Haque SA and Howard CA. *Journal of The American Chemical Society* vol. 143, (51) 21549-21559.American Chemical Society (Acs).

Additive-free, Low-temperature Crystallization of Stable -FAPbI₃ Perovskite.

Du T, Macdonald TJ, Yang RX, Li M, Jiang Z, Mohan L, Xu W, Su Z, Gao X, Whiteley R, Lin C-T, Min G, Haque SA, Durrant JR, Persson KA, McLachlan MA and Briscoe J. *Adv Mater* e2107850-e2107850.

CuInS₂ Quantum Dot and Polydimethylsiloxane Nanocomposites for AllOptical Ultrasound and Photoacoustic Imaging.

Bodian S, Colchester RJ, Macdonald TJ, Ambroz F, de Gutierrez MB, Mathews SJ, Fong YMM, Maneas E, Welsby KA, Gordon RJ, Collier P, Zhang EZ, Beard PC, Parkin IP, Desjardins AE and Noimark S. *Advanced Materials Interfaces* vol. 8, (20).Wiley.

Correlating the Active Layer Structure and Composition with the Device Performance and Lifetime of Amino-Acid-Modified Perovskite Solar Cells.

Lin C-T, Xu W, Macdonald TJ, Ngiam J, Kim J-H, Du T, Xu S, Tuladhar PS, Kang H, Lee K, Durrant JR and McLachlan MA. *Acs Applied Materials & Interfaces* vol. 13, (36) 43505-43515.American Chemical Society (Acs).

Lewis Base Passivation Mediates Charge Transfer at Perovskite Heterojunctions.

Westbrook RJE, Macdonald TJ, Xu W, Lanzetta L, Marin-Beloqui JM, Clarke TM and Haque SA. *Journal of The American Chemical Society* vol. 143, (31) 12230-12243.American Chemical Society (Acs).

Aerosol Assisted Solvent Treatment: A Universal Method for Performance and Stability Enhancements in Perovskite Solar Cells.

Du T, Ratnasingham SR, Kosasih FU, Macdonald TJ, Mohan L, Augurio A, Ahli H, Lin CT, Xu S, Xu W, Binions R, Ducati C, Durrant JR, Briscoe J and McLachlan MA. *Advanced Energy Materials*.

1D2D Synergistic MXeneNanotubes Hybrids for Efficient Perovskite Solar Cells.

Bati ASR, Hao M, Macdonald TJ, Batmunkh M, Yamauchi Y, Wang L and Shapter JG. *Small* vol. 17, (32).Wiley.

Degradation mechanism of hybrid tin-based perovskite solar cells and the critical role of tin (IV) iodide.

Lanzetta L, Webb T, Zibouche N, Liang X, Ding D, Min G, Westbrook RJE, Gaggio B, Macdonald TJ, Islam MS and Haque SA. *Nature Communications* vol. 12, (1).Springer Nature.

Lessons learned from spiro-OMeTAD and PTAA in perovskite solar cells.

Rombach FM, Haque SA and Macdonald TJ. *Energy & Environmental Science* vol. 14, (10) 5161-5190.Royal Society of Chemistry (Rsc).

Chemical vapour deposition (CVD) of nickel oxide using the novel nickel dialkylaminoalkoxide precursor [Ni(dmamp) 2] (dmamp = 2-dimethylamino-2-methyl-1-propanolate).

Wilson RL, Macdonald TJ, Lin C-T, Xu S, Taylor A, Knapp CE, Guldin S, McLachlan MA, Carmalt CJ and Blackman CS. *Rsc Advances* vol. 11, (36) 22199-22205.Royal Society of Chemistry (Rsc).

Ultrathin polymethylmethacrylate interlayers boost performance of hybrid tin halide perovskite solar cells.

Ding D, Lanzetta L, Liang X, Min G, Giza M, Macdonald TJ and Haque SA. *Chemical Communications* vol. 57, (41) 5047-5050.Royal Society of Chemistry (Rsc).

A synergistic Cs₂CO₃ ETL treatment to incorporate Cs cation into perovskite solar cells via two-step scalable fabrication.

Yavari M, Liu X, Webb T, Jayawardena KDGI, Xiang Y, Kern S, Hinder S, Macdonald TJ, Silva SRP, Sweeney SJ and Zhang W. *Journal of Materials Chemistry C* vol. 9, (12) 4367-4377. *Royal Society of Chemistry (Rsc)*.

Bandwidth limits of luminescent solar concentrators as detectors in free-space optical communication systems.

Portnoi M, Haigh PA, Macdonald TJ, Ambroz F, Parkin IP, Darwazeh I and Papakonstantinou I. *Light: Science & Applications* vol. 10, (1). *Springer Nature*.

2020

Ambient Fabrication of Organic-Inorganic Hybrid Perovskite Solar Cells.

Zhang Y, Kirs A, Ambroz F, Lin C, Bati ASR, Parkin IP, Shapter JG, Batmunkh M and Macdonald TJ. *Small Methods* vol. 5, (1). *Wiley*.

Size dependency of gold nanoparticles interacting with model membranes.

Contini C, Hindley JW, Macdonald TJ, Barritt JD, Ces O and Quirke N. *Communications Chemistry* vol. 3, (1). *Springer Nature*.

Corrigendum: Influence of Lithium and Lanthanum Treatment on TiO₂ Nanofibers and Their Application in n-p Solar Cells.

Ambroz F, Sathasivam S, Lee R, Gadipelli S, Lin C, Xu S, Poduval RK, McLachlan MA, Papakonstantinou I, Parkin IP and Macdonald TJ. *Chemelectrochem* vol. 7, (9) 2173-2173. *Wiley*.

All-Silicone-based Distributed Bragg Reflectors for Efficient Flexible Luminescent Solar Concentrators.

Portnoi M, Macdonald TJ, Sol C, Robbins TS, Li T, Schläfer J, Guldin S, Parkin IP and Papakonstantinou I. *Nano Energy* vol. 70. *Elsevier*.

Hot Carrier Dynamics in Perovskite Nanocrystal Solids: Role of the Cold Carriers, Nanoconfinement, and the Surface.

Hopper TR, Gorodetsky A, Jeong A, Krieg F, Bodnarchuk MI, Maimaris M, Chaplain M, Macdonald TJ, Huang X, Lovrincic R, Kovalenko MV and Bakulin AA. *Nano Letters* vol. 20, (4) 2271-2278. *American Chemical Society (Acs)*.

Enhancing the operational stability of unencapsulated perovskite solar cells through CuAg bilayer electrode incorporation.

Lin C-T, Ngiam J, Xu B, Chang Y-H, Du T, Macdonald TJ, Durrant JR and McLachlan MA. *Journal of Materials Chemistry A* vol. 8, (17) 8684-8691. *Royal Society of Chemistry (Rsc)*.

2019

Origin of Open-Circuit Voltage Enhancements in Planar Perovskite Solar Cells Induced by Addition of Bulky Organic Cations.

Lin C, Lee J, Kim J, Macdonald TJ, Ngiam J, Xu B, Daboczi M, Xu W, Pont S, Park B, Kang H, Kim J, Payne DJ, Lee K, Durrant JR and McLachlan MA. *Advanced Functional Materials* vol. 30, (7). *Wiley*.

Room Temperature Synthesis of Phosphine-Capped Lead Bromide Perovskite Nanocrystals without Coordinating Solvents.

Ambroz F, Xu W, Gadipelli S, Brett DJL, Lin C, Contini C, McLachlan MA, Durrant JR, Parkin IP and Macdonald TJ. *Particle & Particle Systems Characterization* vol. 37, (1). *Wiley*.

Carboxylic Acid Functionalization at the Meso-Position of the Bodipy Core and Its Influence on Photovoltaic Performance.

Ambroz F, Donnelly JL, Wilden JD, Macdonald TJ and Parkin IP. *Nanomaterials* vol. 9, (10). *Mdpi*.

Thermochromic VO₂/SiO₂ nanocomposite smart window coatings with narrow phase transition hysteresis and transition gradient width.

Schläfer J, Sol C, Li T, Malarde D, Portnoi M, Macdonald TJ, Laney SK, Powell MJ, Top I, Parkin IP and Papakonstantinou I. *Solar Energy Materials and Solar Cells* vol. 200. *Elsevier*.

Origin of Performance Enhancement in TiO₂/Carbon Nanotube Composite Perovskite Solar Cells.

Macdonald TJ, Batmunkh M, Lin C, Kim J, Tune DD, Ambroz F, Li X, Xu S, Sol C, Papakonstantinou I, McLachlan MA, Parkin IP, Shapter JG and Durrant JR. *Small Methods* vol. 3, (10). *Wiley*.

Influence of Lithium and Lanthanum Treatment on TiO₂ Nanofibers and Their Application in nip Solar Cells.
Ambroz F, Sathasivam S, Lee R, Gadipelli S, Lin C, Xu S, Poduval RK, Mclachlan MA, Papakonstantinou I, Parkin IP and Macdonald TJ. *Chemelectrochem* vol. 6, (14) 3590-3598. Wiley.

Efficient Production of Phosphorene Nanosheets via Shear Stress Mediated Exfoliation for Low Temperature Perovskite Solar Cells.

Batmunkh M, Vimalanathan K, Wu C, Bati ASR, Yu L, Tawfik SA, Ford MJ, Macdonald TJ, Raston CL, Priya S, Gibson CT and Shapter JG. *Small Methods* vol. 3, (5). Wiley.

Copper Metallopolymer Catalyst for the Electrocatalytic Hydrogen Evolution Reaction (HER).

Elmas S, Macdonald TJ, Skinner W, Andersson M and Nann T. *Polymers* vol. 11, (1). Mdpi.

Cucurbituril-mediated quantum dot aggregates formed by aqueous self-assembly for sensing applications.

Peveler WJ, Jia H, Jeon T, Rees K, Macdonald TJ, Xia Z, Chio W-IK, Moorthy S, Parkin IP, Carmalt CJ, Algar WR and Lee T-C. *Chemical Communications* vol. 55, (38) 5495-5498. Royal Society of Chemistry (Rsc).

Surface radio-mineralisation mediates chelate-free radiolabelling of iron oxide nanoparticles.

Patrick PS, Bogart LK, Macdonald TJ, Southern P, Powell MJ, Zaw-Thin M, Voelcker NH, Parkin IP, Pankhurst QA, Lythgoe MF, Kalber TL and Bear JC. *Chemical Science* vol. 10, (9) 2592-2597. Royal Society of Chemistry (Rsc).

2018

TiO₂ nanofiber photoelectrochemical cells loaded with sub-12nm AuNPs: Size dependent performance evaluation.

Macdonald TJ, Ambroz F, Batmunkh M, Li Y, Kim D, Contini C, Poduval R, Liu H, Shapter JG, Papakonstantinou I and Parkin IP. *Materials Today Energy* vol. 9, 254-263. Elsevier.

Evaluation of the BET Theory for the Characterization of Meso and Microporous MOFs.

Ambroz F, Macdonald TJ, Martis V and Parkin IP. *Small Methods* vol. 2, (11). Wiley.

Electrospun Composites of Polycaprolactone and Porous Silicon Nanoparticles for the Tunable Delivery of Small Therapeutic Molecules.

McInnes SJP, Macdonald TJ, Parkin IP, Nann T and Voelcker NH. *Nanomaterials* vol. 8, (4). Mdpi.

Ambient air synthesis of multi-layer CVD graphene films for low-cost, efficient counter electrode material in dye-sensitized solar cells.

Seo DH, Batmunkh M, Fang J, Murdock AT, Yick S, Han Z, Shearer CJ, Macdonald TJ, Lawn M, Bendavid A, Shapter JG and Ostrikov K. *Flatchem* vol. 8, 1-8. Elsevier.

A new family of urea-based low molecular-weight organogelators for environmental remediation: the influence of structure.

Peveler WJ, Packman H, Alexander S, Chauhan RR, Hayes LM, Macdonald TJ, Cockcroft JK, Rogers S, Aarts DGAL, Carmalt CJ, Parkin IP and Bear JC. *Soft Matter* vol. 14, (43) 8821-8827. Royal Society of Chemistry (Rsc).

Effects of bovine serum albumin on light activated antimicrobial surfaces.

Lourenço C, Macdonald TJ, Gavriilidis A, Allan E, MacRobert AJ and Parkin IP. *Rsc Advances* vol. 8, (60) 34252-34258. Royal Society of Chemistry (Rsc).

2017

Plasmonic Gold Nanostars Incorporated into High Efficiency Perovskite Solar Cells.

Batmunkh M, Macdonald TJ, Peveler WJ, Bati ASR, Carmalt CJ, Parkin IP and Shapter JG. *Chemsuschem* vol. 10, (19) 3750-3753. Wiley.

Electrospinning of Photocatalytic Electrodes for Dye-sensitized Solar Cells.

Canever N, Hughson F, Macdonald TJ and Nann T. *Journal of Visualized Experiments* (124). Myjove Corporation.

Optical fiber ultrasound transmitter with electrospun carbon nanotube-polymer composite.

Poduval RK, Noimark S, Colchester RJ, Macdonald TJ, Parkin IP, Desjardins AE and Papakonstantinou I. *Applied Physics Letters* vol. 110, (22). Aip Publishing.

Trends in AluminiumBased Intercalation Batteries.

Ambroz F, Macdonald TJ and Nann T. *Advanced Energy Materials* vol. 7, (15). Wiley.

{Ni4O4} Cluster Complex to Enhance the Reductive Photocurrent Response on Silicon Nanowire Photocathodes.

Mange YJ, Chandrasekaran S, Hollingsworth N, Voelcker NH, Parkin IP, Nann T and Macdonald TJ. *Nanomaterials* vol. 7, (2). Mdpi.

Carbon Nanotubes in TiO₂ Nanofiber Photoelectrodes for HighPerformance Perovskite Solar Cells.

Batmunkh M, Macdonald TJ, Shearer CJ, Bat Erdene M, Wang Y, Biggs MJ, Parkin IP, Nann T and Shapter JG. *Advanced Science* vol. 4, (4). Wiley.

Continuous flow synthesis of citrate capped gold nanoparticles using UV induced nucleation.

du Toit H, Macdonald TJ, Huang H, Parkin IP and Gavriilidis A. *Rsc Advances* vol. 7, (16) 9632-9638. Royal Society of Chemistry (Rsc).

2016

Photo-doping of plasma-deposited polyaniline (PAni).

Elmas S, Beelders W, Nash J, Macdonald TJ, Jasieniak M, Griesser HJ and Nann T. *Rsc Advances* vol. 6, (74) 70691-70699. Royal Society of Chemistry (Rsc).

SWCNT photocathodes sensitised with InP/ZnS coreshell nanocrystals.

Macdonald TJ, Tune DD, Dewi MR, Bear JC, McNaughter PD, Mayes AG, Skinner WM, Parkin IP, Shapter JG and Nann T. *Journal of Materials Chemistry C* vol. 4, (16) 3379-3384. Royal Society of Chemistry (Rsc).

2015

A TiO₂ NanofiberCarbon NanotubeComposite Photoanode for Improved Efficiency in DyeSensitized Solar Cells.

Macdonald TJ, Tune DD, Dewi MR, Gibson CT, Shapter JG and Nann T. *ChemSusChem* vol. 8, (20) 3396-3400. Wiley.

Boron-Doped Silicon Diatom Frustules as a Photocathode for Water Splitting.

Chandrasekaran S, Macdonald TJ, Gerson AR, Nann T and Voelcker NH. *Acs Applied Materials & Interfaces* vol. 7, (31) 17381-17387. American Chemical Society (Acs).

Doping Group IIB Metal Ions into Quantum Dot Shells via the OnePot Decomposition of MetalDithiocarbamates.

Bear JC, Hollingsworth N, Roffey A, McNaughter PD, Mayes AG, Macdonald TJ, Nann T, Ng WH, Kenyon AJ, Hogarth G and Parkin IP. *Advanced Optical Materials* vol. 3, (5) 704-712. Wiley.

Porous silicon nanoparticles as a nanophotocathode for photoelectrochemical water splitting.

Chandrasekaran S, McInnes SJP, Macdonald TJ, Nann T and Voelcker NH. *Rsc Advances* vol. 5, (104) 85978-85982. Royal Society of Chemistry (Rsc).

Rapid microwave assisted synthesis of nearly monodisperse aqueous CuInS₂/ZnS nanocrystals.

Mange YJ, Dewi MR, Macdonald TJ, Skinner WM and Nann T. *CrystEngComm* vol. 17, (41) 7820-7823. Royal Society of Chemistry (Rsc).

CuInS₂/ZnS nanocrystals as sensitisers for NiO photocathodes.

Macdonald TJ, Mange YJ, Dewi MR, Islam HU, Parkin IP, Skinner WM and Nann T. *Journal of Materials Chemistry A* vol. 3, (25) 13324-13331. Royal Society of Chemistry (Rsc).

2014

Photoresponsive properties of ultrathin silicon nanowires.

Tran DP, Macdonald TJ, Wolfrum B, Stockmann R, Nann T, Offenhäusser A and Thierry B. *Applied Physics Letters* vol. 105, (23). Aip Publishing.

NiO Nanofibers as a Candidate for a Nanophotocathode.

Macdonald TJ, Xu J, Elmas S, Mange YJ, Skinner WM, Xu H and Nann T. *Nanomaterials* vol. 4, (2) 256-266. Mdpi.

Cation exchange of aqueous CuInS₂ quantum dots.

Macdonald TJ, Mange YJ, Dewi M, McFadden A, Skinner WM and Nann T. *Crystengcomm* vol. 16, (40) 9455-9460. *Royal Society of Chemistry (Rsc)*.

A quantum dot sensitized catalytic porous silicon photocathode.

Chandrasekaran S, Macdonald TJ, Mange YJ, Voelcker NH and Nann T. *Journal of Materials Chemistry A* vol. 2, (25) 9478-9481. *Royal Society of Chemistry (Rsc)*.

2012

Functionalization of vertically aligned carbon nanotubes with polystyrene via surface initiated reversible addition fragmentation chain transfer polymerization.

Macdonald T, Gibson CT, Constantopoulos K, Shapter JG and Ellis AV. *Applied Surface Science* vol. 258, (7) 2836-2843. *Elsevier*.

2011

Quantum Dot Sensitized Photoelectrodes.

Macdonald TJ and Nann T. *Nanomaterials* vol. 1, (1) 79-88. *Mdpi*.