

**(19) World Intellectual Property  
Organization**  
International Bureau



WIPO | PCT



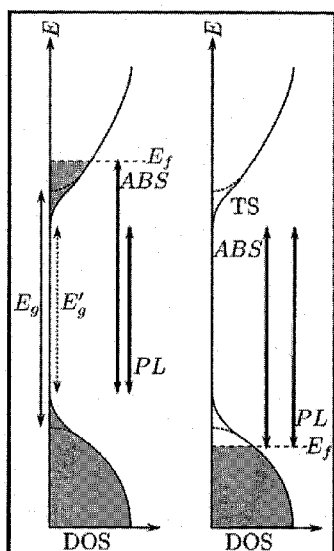
**(10) International Publication Number**  
**WO 2012/111009 A8**

**(43) International Publication Date**  
**23 August 2012 (23.08.2012)**

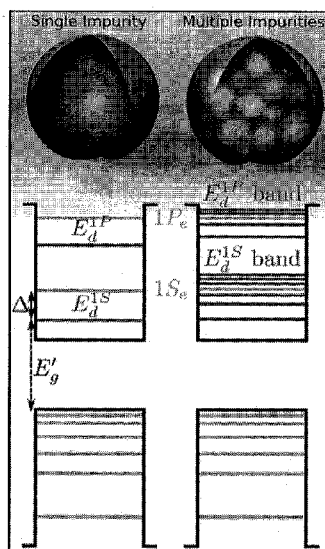
- |                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>(51) International Patent Classification:</b><br/> <i>H01L 29/06</i> (2006.01)      <i>C09K 11/08</i> (2006.01)<br/> <i>B01J 13/00</i> (2006.01)      <i>C09K 11/62</i> (2006.01)</p>                                                                                                                                                                                                   | <p><b>(72) Inventors; and</b><br/> <b>(75) Inventors/Applicants</b> <i>(for US only):</i> <b>COHEN, Guy</b> [IL/IL]; 23/1 Einstein Street, 69101 Tel Aviv (IL). <b>MILLO, Oded</b> [IL/IL]; 6/4 Kobobi Street, 96757 Jerusalem (IL). <b>MOCATTA, David</b> [IL/IL]; 13/17 Tse'ela Street, 70700 Gadera (IL). <b>RABANI, Eran</b> [IL/IL]; 153 Hagai Street, 90836 Har Adar (IL). <b>BANIN, Uri</b> [IL/IL]; 37 Yasmin Street, 90805 Mevasseret Zion (IL).</p>                                                                                                                                          |
| <p><b>(21) International Application Number:</b><br/> PCT/IL2012/050046</p>                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <p><b>(22) International Filing Date:</b><br/> 14 February 2012 (14.02.2012)</p>                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <p><b>(25) Filing Language:</b> English</p>                                                                                                                                                                                                                                                                                                                                                   | <p><b>(74) Agent:</b> <b>REINHOLD COHN AND PARTNERS;</b> P.O.B. 13239, 61131 Tel Aviv (IL).</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <p><b>(26) Publication Language:</b> English</p>                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <p><b>(30) Priority Data:</b><br/> 61/442,522      14 February 2011 (14.02.2011)      US</p>                                                                                                                                                                                                                                                                                                  | <p><b>(81) Designated States</b> <i>(unless otherwise indicated, for every kind of national protection available):</i> AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.</p> |
| <p><b>(71) Applicants</b> <i>(for all designated States except US):</i> <b>YIS-SUM RESEARCH DEVELOPMENT COMPANY OF THE HEBREW UNIVERSITY OF JERUSALEM LTD.</b> [IL/IL]; Hi Tech Park Edmond Safra Campus Givat Ram, 91390 Jerusalem (IL). <b>RAMOT AT TEL-AVIV UNIVERSITY LTD.</b> [IL/IL]; Tel Aviv University Campus The Senate, Building, Floor-1 P.O. Box 39296, 61392 Tel Aviv (IL).</p> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

[Continued on next page]

**(54) Title:** HEAVILY DOPED SEMICONDUCTOR NANOPARTICLES



### Figure 1A



### Figure 1B

**(57) Abstract:** Herein, provided are heavily doped colloidal semiconductor nanocrystals and a process for introducing an impurity to semiconductor nanoparticles, providing control of band gap, Fermi energy and presence of charge carriers. The method is demonstrated using InAs colloidal nanocrystals, which are initially undoped, and are metal-doped (Cu, Ag, Au) by adding a metal salt solution.



**(84) Designated States** (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

**Published:**

— *with international search report (Art. 21(3))*

**(88) Date of publication of the international search report:**

11 October 2012

**(48) Date of publication of this corrected version:**

6 December 2012

**(15) Information about Correction:**

see Notice of 6 December 2012