**Electronic Supplementary Information**

# Carbon dot-Au(I)Ag(0) assembly for construction of artificial light harvesting system

*Jayasmita Jana,*[a] *Teresa Aditya,*[a] *Tarasankar Pal*[*a]

[a]Department of Chemistry, Indian Institute of Technology, Kharagpur-721302, India

[*]Corresponding author. Phone: +91-03222 283320. E-mail: tpal@chem.iitkgp.ernet.in

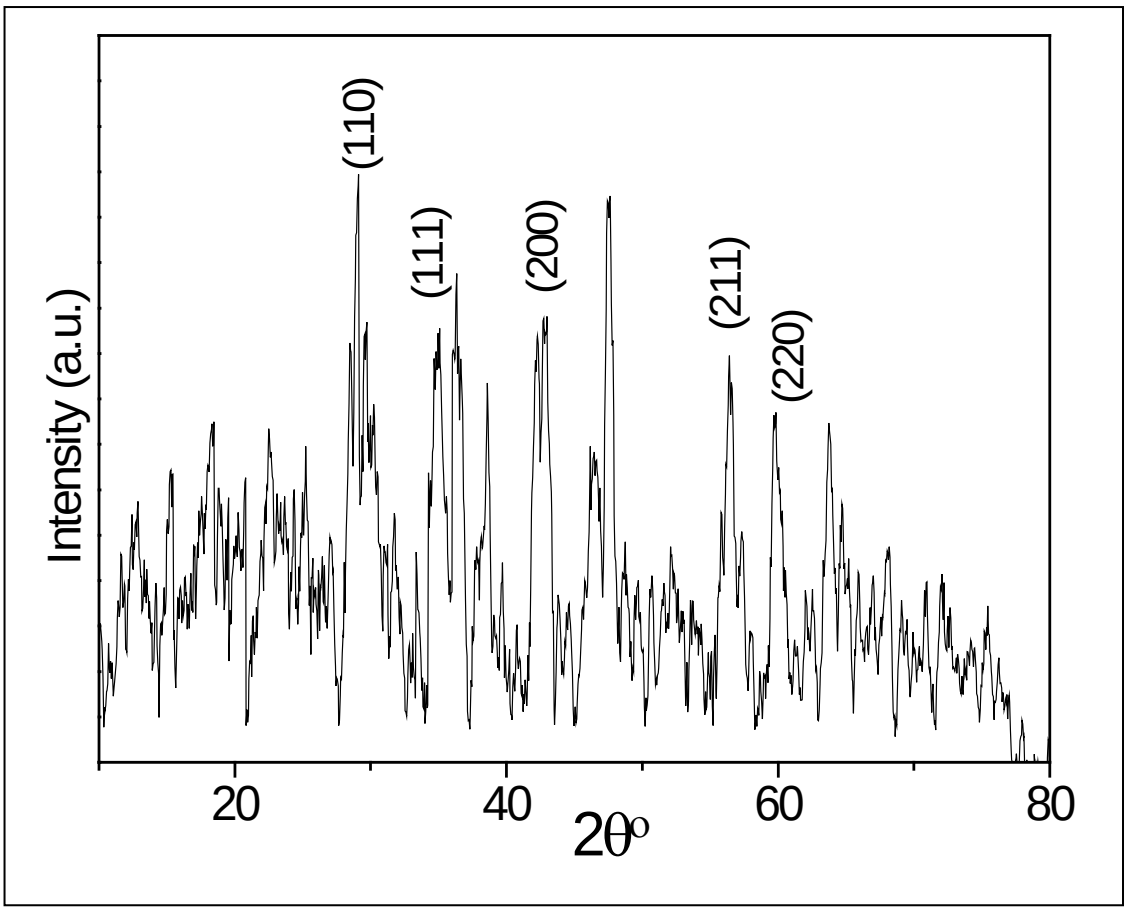


Figure S1: XRD pattern of the brown residue. XRD data suggests that the precipitate contains $Cu_2O$.

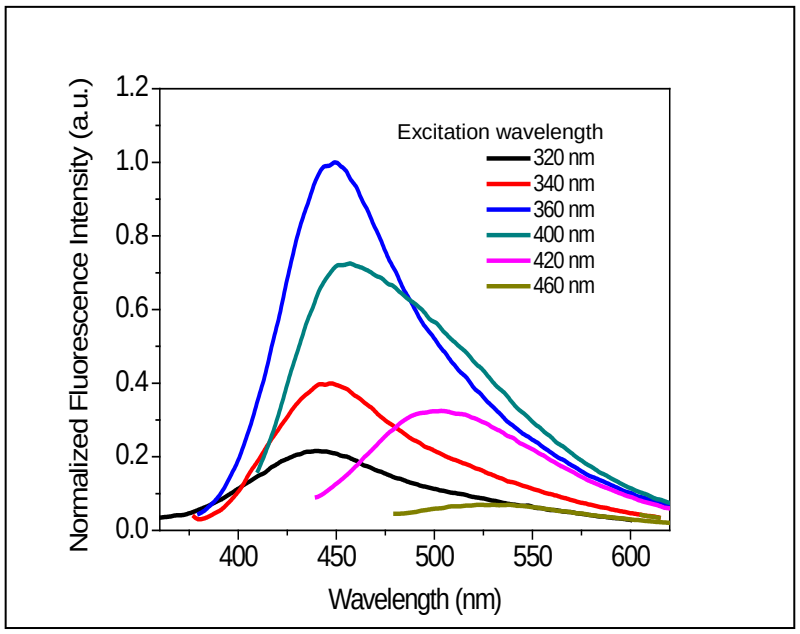


Figure S2: Fluorescence spectral profile of GCD at different excitation wavelength.

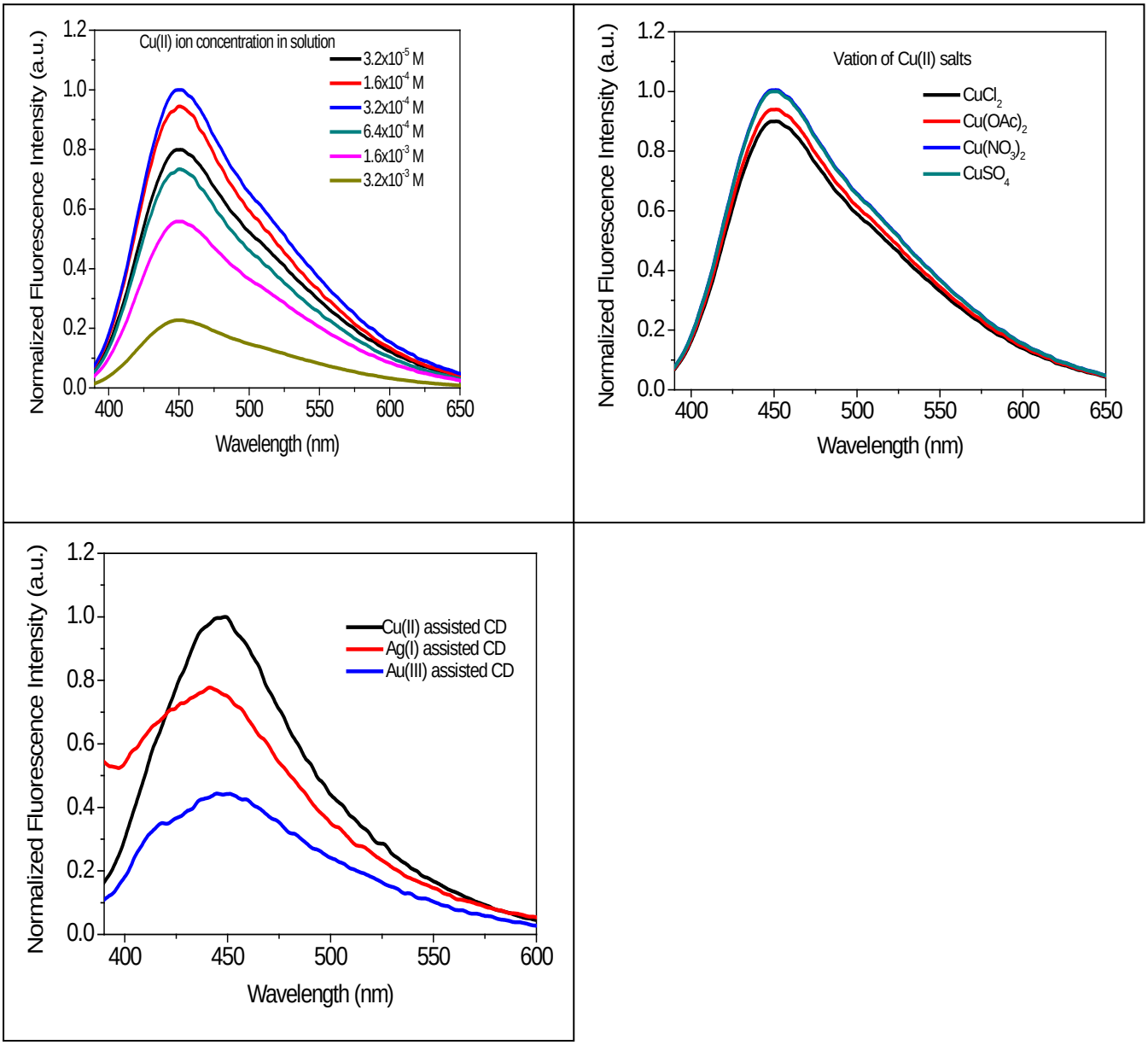


Figure S3: (A) Fluorescence spectral profile of products from MHT outof glucose and $CuSO_4$,$5H_2O$ reaction mixture -with different concentrations of Cu(II). $\lambda_{ex}$=360 nm. (B) Fluorescence spectral profile of products from MHTout of glucose and different Cu(II) salts mixtures. $\lambda_{ex}$=360 nm. (C) Fluorescence spectral profile of products from MHT out of glucose and Cu(II), Ag(I) and Au(III) salts. $\lambda_{ex}$=360 nm

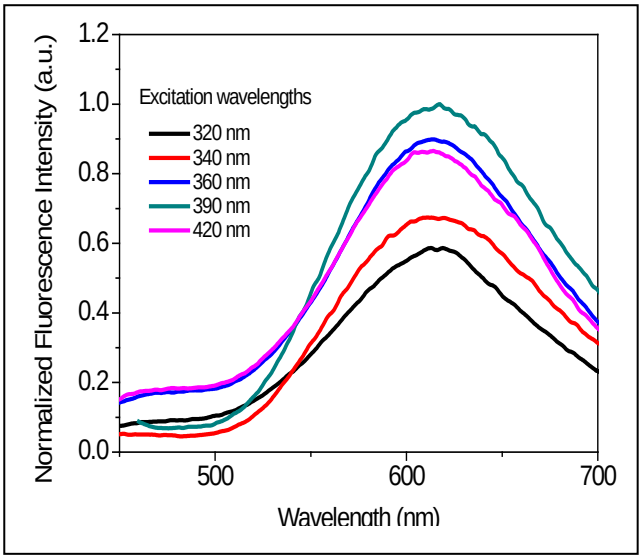


Figure S4: Fluorescence spectral profile of AuAgFA at different excitation wavelengths keeping the emission maximum fixed at 620 nm.

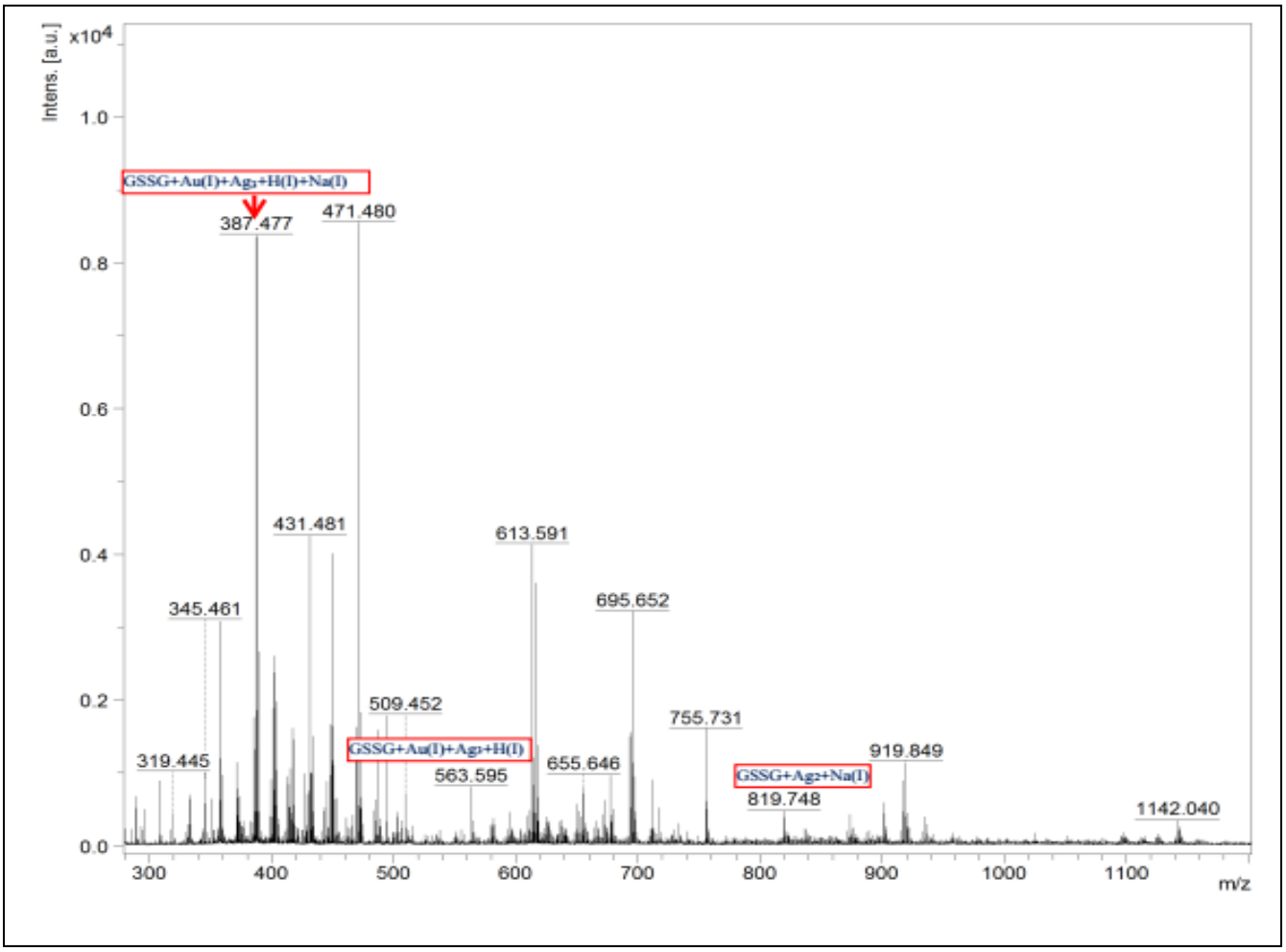


Figure S5: MALDI-Mass spectrum of AuAgFA.

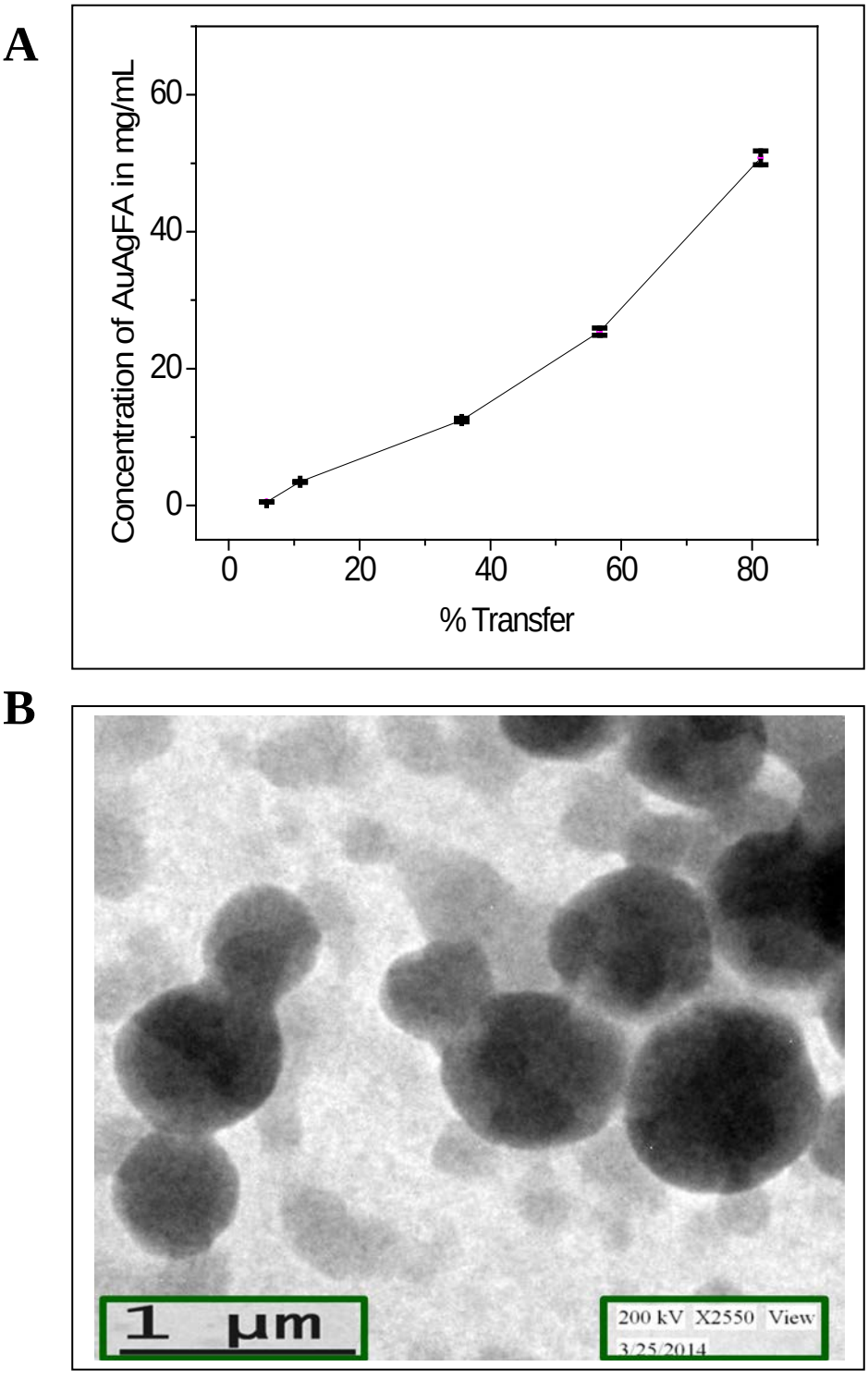


Figure S6: (A) The change in energy transfer efficiency in the presence of different concentrations of AuAgFA (B) TEM image of GCD-AuAgFA system on a 1:1 concentration ration.

Table S1: An account of fluorescence lifetime of GCD, AuAgFA and GAD-AuAgFA (N). N denotes different concentrations of AuAgFA.

N=1: 0.52 mg/mL of AuAgFA

N=2: 3.45 mg/mL of AuAgFA

N=3: 10.5 mg/mL of AuAgFA

N=4: 25.4 mg/mL of AuAgFA

N=5: 50.8 mg/mL of AuAgFA

| Compound | $\tau_1$(ns) | $\tau_2$ (ns) | $\tau_3$ (ns) | $\alpha_1$ | $\alpha_2$ | $\alpha_3$ | $\chi^2$ | $\tau_{avg}$ (ns) [upto two decimal] |
|---|---|---|---|---|---|---|---|---|
| GCD | 8.01 | 17.61 | - | 94.68 | 5.32 | - | 0.87 | 8.51 |
| GCD-AuAgFA (1) | 8.01 | 8.018 | 8.018 | 94.4 | 2.7 | 2.9 | 0.89 | 8.01 |
| GCD-AuAgFA (2) | 8.01 | 0.8 | 0.8 | 94.27 | 3.12 | 2.16 | 1.1 | 7.58 |
| GCD-AuAgFA (3) | 8.01 | 0.801 | 0.82 | 65.02 | 16.27 | 18.71 | 0.89 | 5.48 |
| GCD-AuAgFA (4) | 8.01 | 0.801 | 0.82 | 40.19 | 21.11 | 38.7 | 0.89 | 3.69 |
| GCD-AuAgFA (5) | 8.01 | 0.801 | 0.82 | 10.99 | 10.52 | 78.49 | 0.89 | 1.59 |
| AuAgFA | 6.045 | 6.045 | - | 45.64 | 54.35 | - | 1.102 | 6.045 |

Table S2: An account of energy transfer efficiency of different donor-acceptor systems.

| System | Energy transfer efficiency | Ref. |
|---|---|---|
| A sulfato-**β**-cyclodextrin/oligo(phenylenevinylene) derivative/nile red system | 72% | Ref. 1 |
| The energy transfer occurs from the 28 photoexcited zinc porphyrin units to the focal free-base porphyrin unit occurs in a large, star-shaped dendritic multiporphyrin array in which the chromophore units are linked through flexible ether groups. | 71% | Ref. 2 |
| Carbon dot- BSA-protein-capped goldnanocluster system<br>Carbon dots- coumarin encapsulated BSA-protein-capped gold nanocluster system | 63%<br>83% | Ref.3 |
| BODIPY based molecules: energy acceptors. Single poly(aryl ether) dendron amphiphile nanorods: antenna chromophore. | 72% | Ref. 4 |
| Cationic xanthene derivative: Donor<br>Cationic porphyrin: Acceptor | 80% | Ref. 5 |
| **Carbon dot: donor**<br>**GSH-AuAg assembly: acceptor** | 81.3% | Present work |

**References:**


1. J.-J.Li, Y. Chen, J. Yu, N. Cheng, Y. Liu, *Adv. Mater*. 2017, **29**, 1701905(1-5).

2. M.-S. Choi, T. Aida, T. Yamazaki, I. Yamazaki, *Angewandte Chemie*, 2001, **113**, 3294-3298.

3. M.K. Barman, B. Paramanik, D. Bain, A. Patra, *Chem. Eur. J*. 2016, **22**, 11699 – 11705

4. A.Maity, A. Dey, M. Gangopadhyay, A. Das, *Nanoscale*, 2018, **DOI: 10.1039/C7NR07663K**.

5. Y.Ohtani, T. Shimada, S.Takag, *J. Phys. Chem. C* 2015, **119**, 18896−18902.