Fabrication of Au/Pd plasmonic alloy on UiO-66-NH_2:

An efficient visible light induced photocatalyst towards Suzuki Miyaura coupling reaction under ambient conditions

Satyabrata Subudhi[a], Sriram Mansingh[a], Suraj Prakash Tripathy[a], Ashutosh Mohanty[b],

Priyabrat Mohapatra[c], Dharitri Rath[d], Kulamani Parida[a]*

[a]Centre for Nano Science and Nanotechnology, Siksha "O" Anusnadhan (Deemed to be University), Bhubaneswar-751030, Odisha, India

[b] Department of solid state and structural chemistry unit, IISc Bangalore-560012, India

[c] Department of Chemistry, C.V. Raman College of Engineering, Bhubaneswar- 752 054, Odisha, India.

[d]Department of Chemistry, Rajdhani College, Bhubaneswar-751003, Odisha, India

* Corresponding author

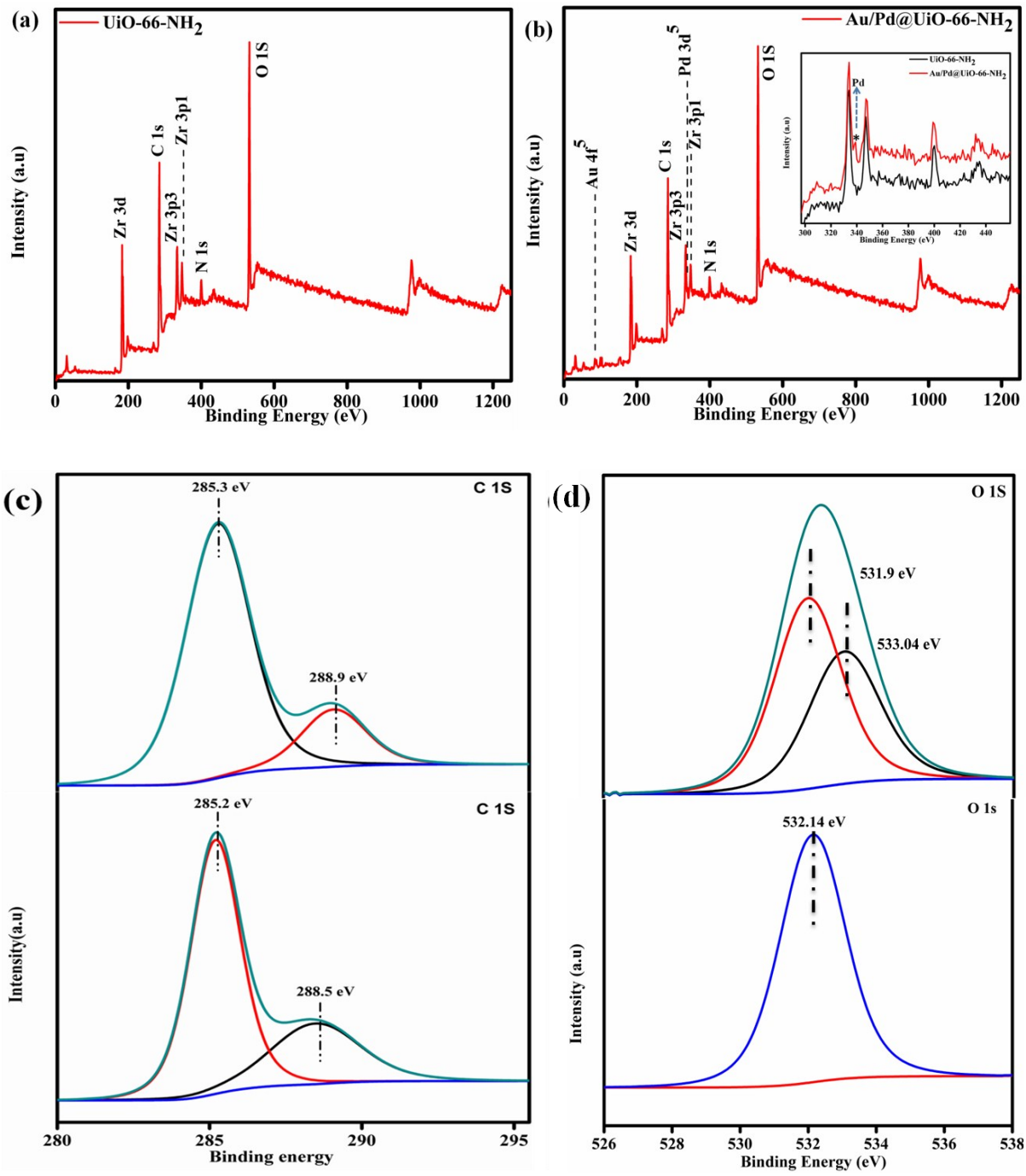
---

* Corresponding author

E-mail: paridakulamani@yahoo.com,

kulamaniparida@soauniversity.ac.in,

Tel. No. +91-674-2351777 Fax. +91-674-2350642


(a)
UiO-66-NH2
Intensity (a.u)
Zr 3d
C 1s
Zr 3p3
Zr 3p1
N 1s
O 1S
Binding Energy (eV)
(b)
Au/Pd@UiO-66-NH2
Au 4f5
Pd 3d5
UiO-66-NH2
Au/Pd@UiO-66-NH2
Pd
(c)
285.3 eV
C 1S
288.9 eV
285.2 eV
288.5 eV
Intensity(a.u)
Binding energy
(d)
O 1S
531.9 eV
533.04 eV
O 1s
532.14 eV
Intensity (a.u)
Binding Energy (eV)

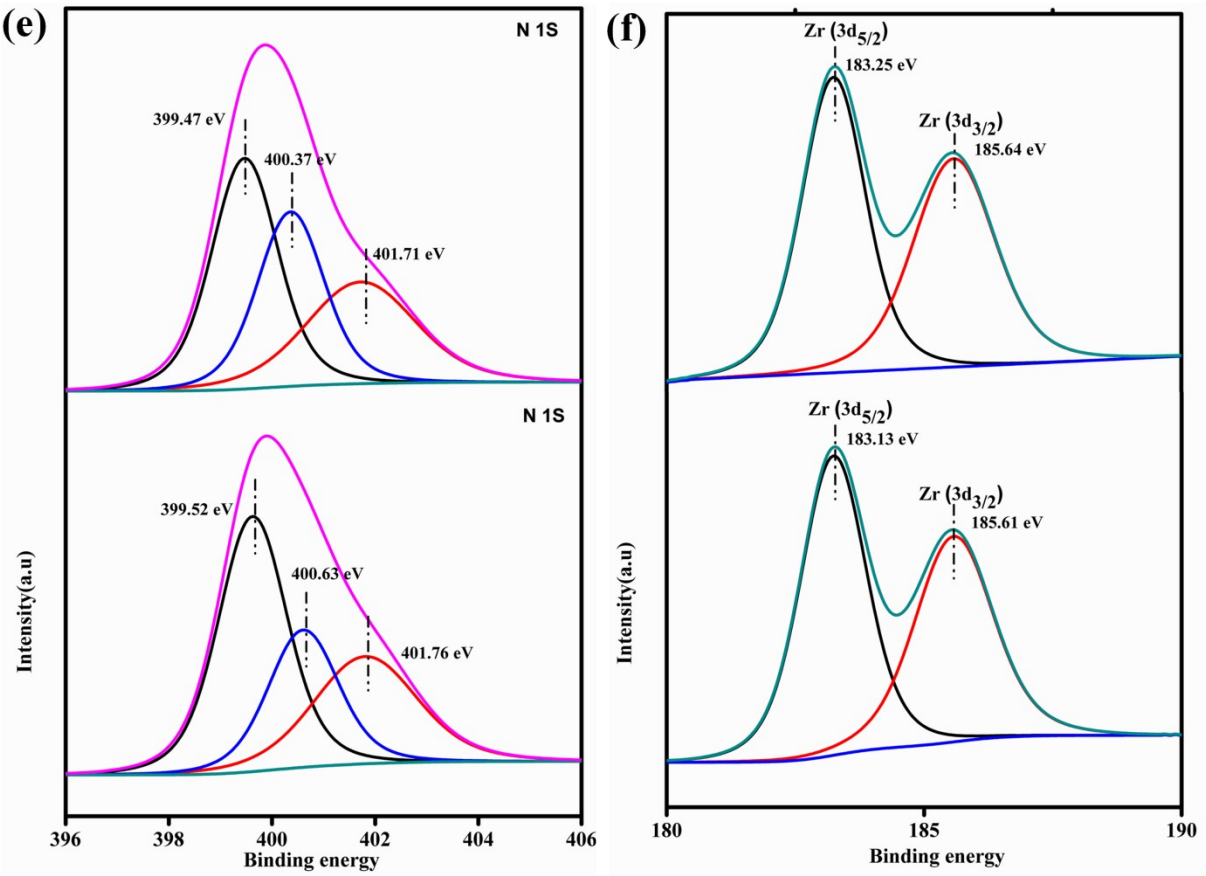


Figure S1: XPS spectra of (a) Survey scan of UiO-66-NH_2 (b) Survey scan of Au/Pd@UiO-66-NH_2 (1:2), Comparative XPS peaks of (c) Carbon (d) Oxygen (e) Nitrogen (f) Zirconium (parent/composite)

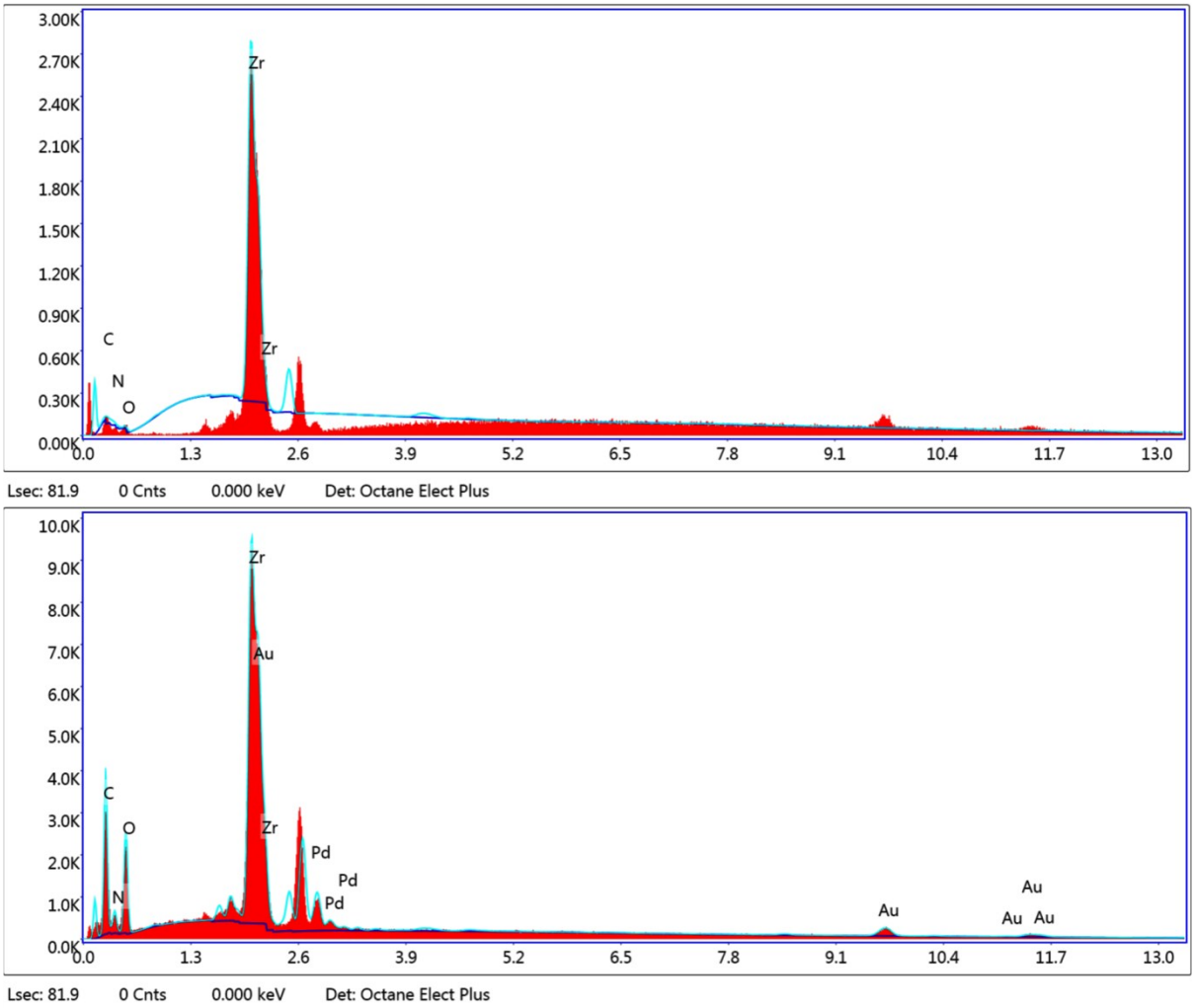


Figure S2: (a) EDAX OF UiO-66-NH_2 (b) EDAX OF Au/Pd@UiO-66-NH_2 (1:2)

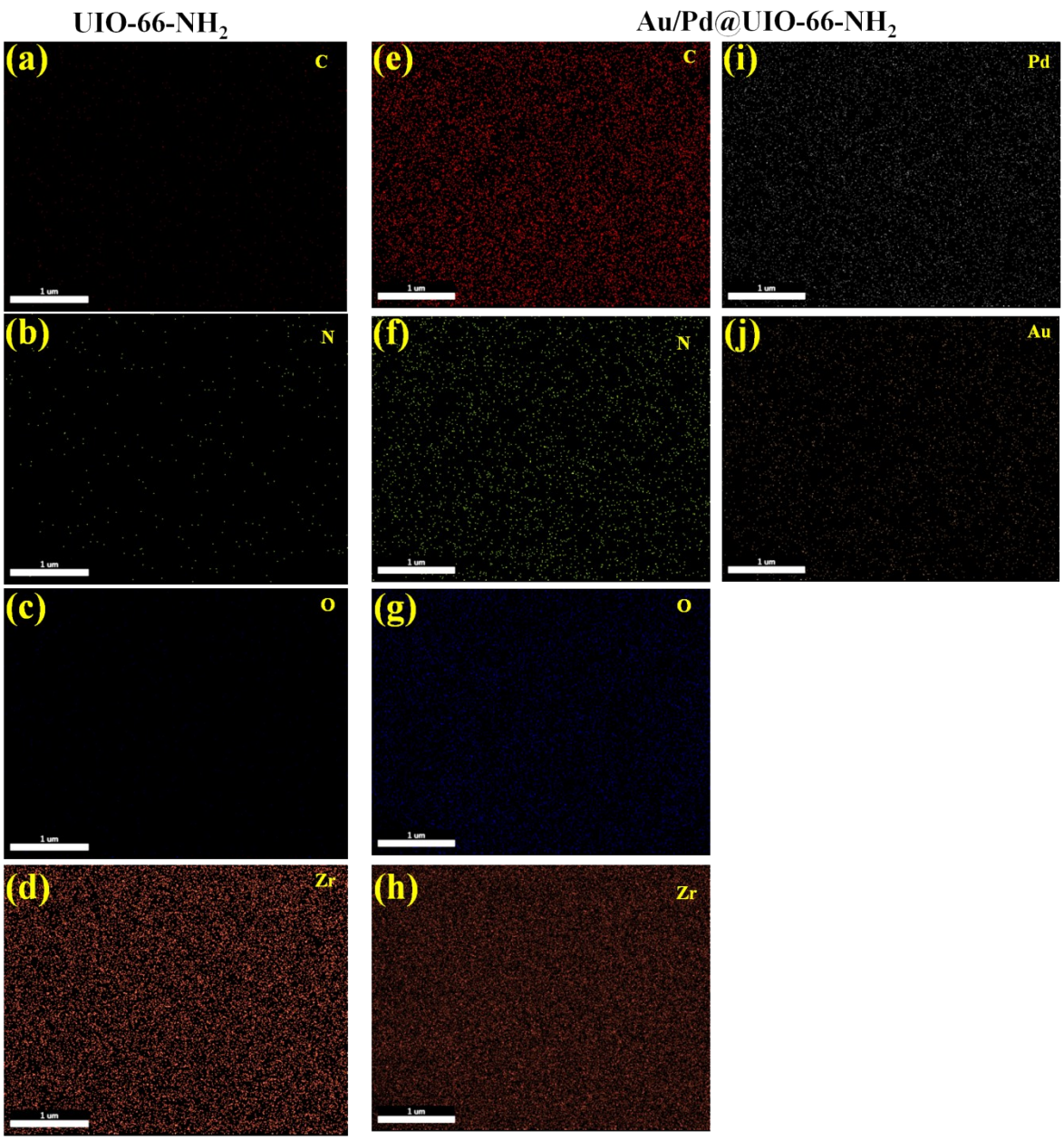


Figure S3: Colour mapping of C, N, O, Zr for UiO-66-NH_2 (a-d) and C, N, O, Zr, Au, Pd for Au/Pd@UiO-66-NH_2 (e-h).

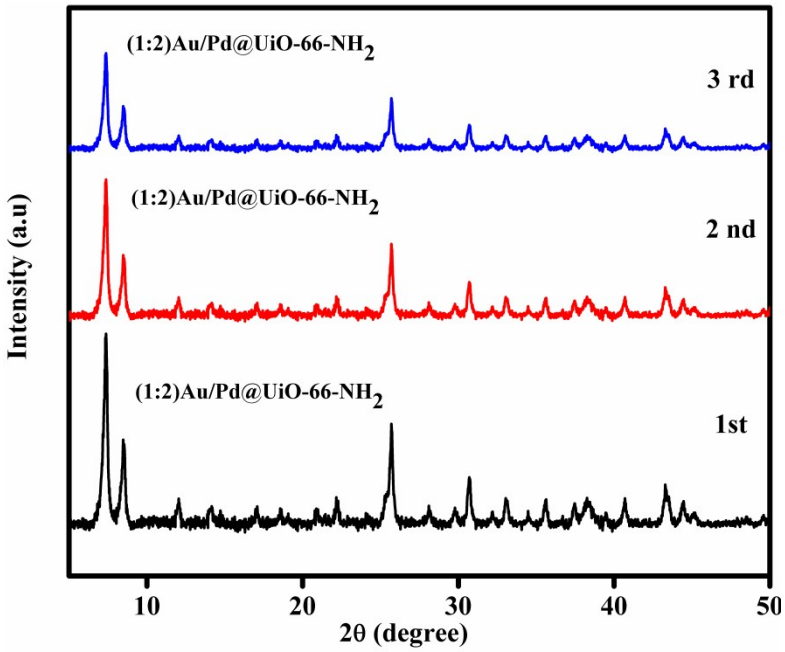


Figure S4: Reusability graph

Table S5: A comparative analysis of various photocatalyst towards SMC reaction:

Sl. no	Catalysts/ Dose	Substrate dose (mmol) (IB/PBA)	Solvent	Time (mins)	Con. (%)	Yield (%)	Sel. (%)	Ref.
1	Cu_1Pd_2@UiO-66-NH_2(Zr)/ (5 mg)	0.1/0.2	DMF/H_2O	120	53	-	>99	52
2	Pd@UiO-66-NH_2(Zr)/ (5 mg)	0.8/1.6	DMF/H_2O	300	99	-	>99	53
3	Pd/Au/PN-CeO_2 / (15 mg)	0.20/0.24	DMF/H_2O	30	99.1	-	98.1	54
4	Au/Pd/TiO_2 / (5 mg)	0.2/0.3	EtOH/H_2O	300	-	98	-	55
5	Pd@B-BO_3 / (10 mg)	0.5/0.55	DMF/H_2O	120	-	98	-	56
6	Au/Pd/ZrO_2 / (50 mg)	1.0/1.5	DMF/H_2O	360	98	-	99	17
7	Pd/MoS_2/ (25 mg)	0.4/0.8	EtOH/H_2O	120	-	50.3	-	57
8	Pd/Au@SiO_2 (20 mg)	0.3/0.2	DMF/H_2O	30	-	78	-	48
9	Au/Pd@UiO-66-NH_2(Zr)/ 20 mg	1.0/2.0	DMF/H_2O	60	98	-	>99	This work
			EtOH/H_2O	60	99	-		

References:

52 D. Sun, M. Xu, Y. Jiang, J. Long, and Z. Li, *Small Methods*, 2018, **2**, 1800164.

53 D. Sun, and Z. Li, *The Journal of Physical Chemistry C*, 2016, **120**, 19744-19750.

54 S. Zhang, C. Chang, Z. Huang, Y. Ma, W. Gao, J. Li, and Y. Qu, *ACS Catalysis*, 2015, **5**, 6481-6488.

55 D. Han, Z. Bao, H. Xing, Y. Yang, Q. Ren, and Z. Zhang, *Nanoscale*, 2017, **9**, 6026-6032.

56 Z.J. Wang, S. Ghasimi, K. Landfester, and K.A. Zhang, *Chemistry of Materials*, 2015, **27**, 1921-1924.

57 H.H. Shin, E. Kang, H. Park, T. Han, C.H. Lee, and D.K. Lim, *Journal of Materials Chemistry A*, 2017, **5**, 24965-24971.