Supporting Information

All-Optical Modulation and Photonic Diode based on spatial self-phase modulation in Porphyrin-Napthalimide Molecules

Sudhanshu Kumar Nayak,[+] Md Soif Ahmed,[+] Rahul Murali,[+] Bota Bhavani,[±] Seelam Prasanthkumar,[±] Lingamallu Giribabu[±], Sai Santosh Kumar Raavi[+,*]

[+]*Ultrafast Photophysics and Photonics Laboratory, Department of Physics, Indian Institute of Technology Hyderabad, Kandi 502285, Telangana, India*

[±]*Polymers & Functional Materials Division, CSIR-Indian Institute of Chemical Technology, Tarnaka, Hyderabad-500007, India*

**Corresponding author Email address: sskraavi@phy.iith.ac.in*

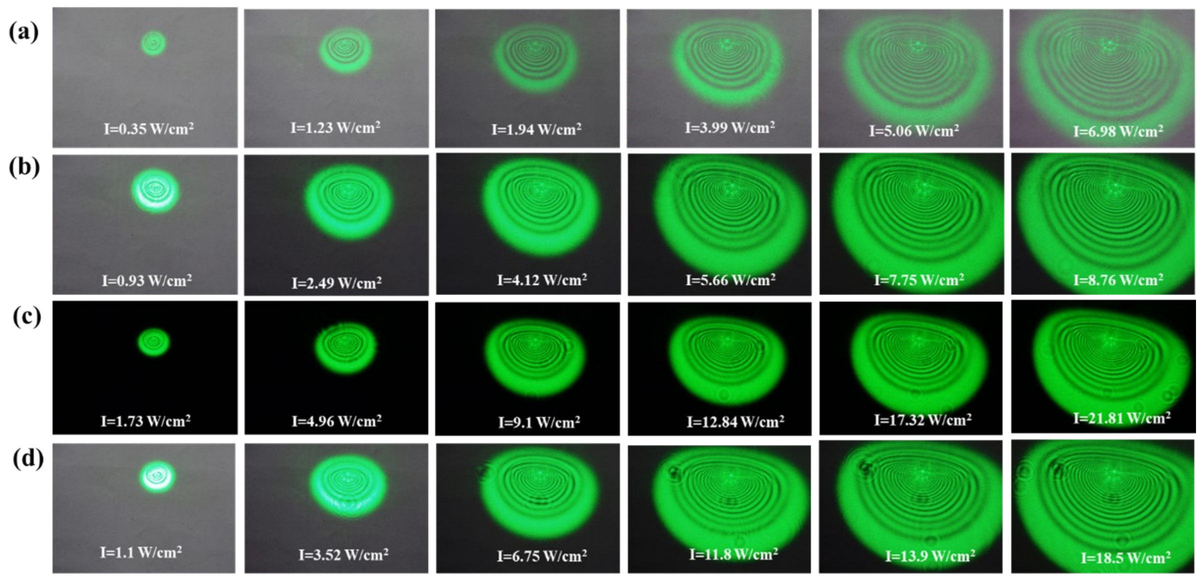

Fig. S1 SSPM patterns of (a) Por-Zn, (b) Por-Ni, (c) Por-Cu, (d) Por-Fb in 10 mm pathlength.

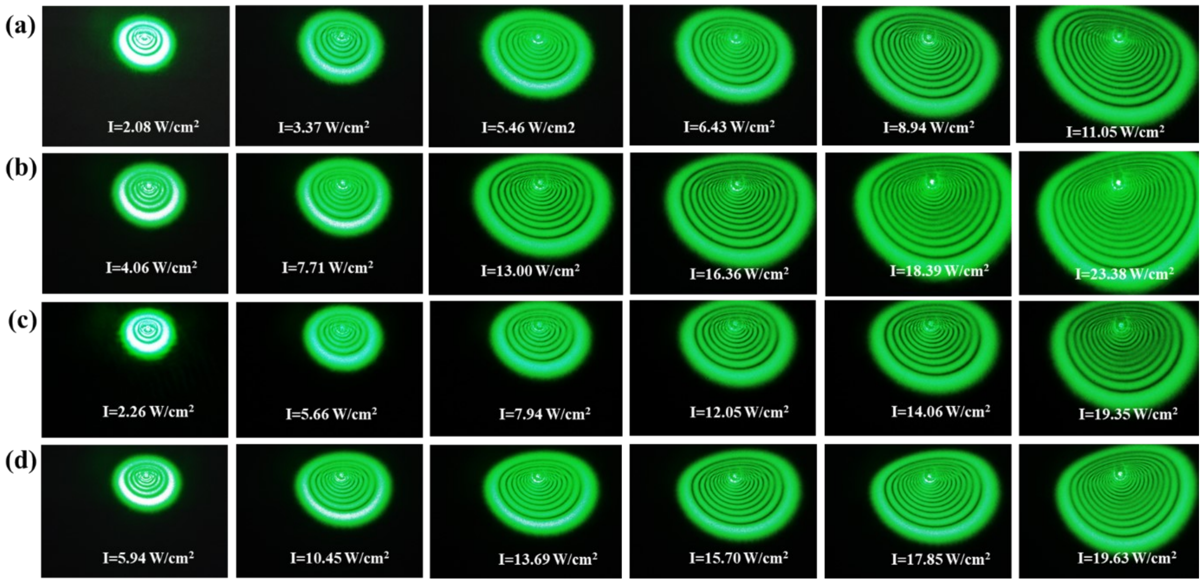

Fig. S2 SSPM patterns of (a) Por-Zn, (b) Por-Ni, (c) Por-Cu, (d) Por-Fb samples in 1mm pathlength.

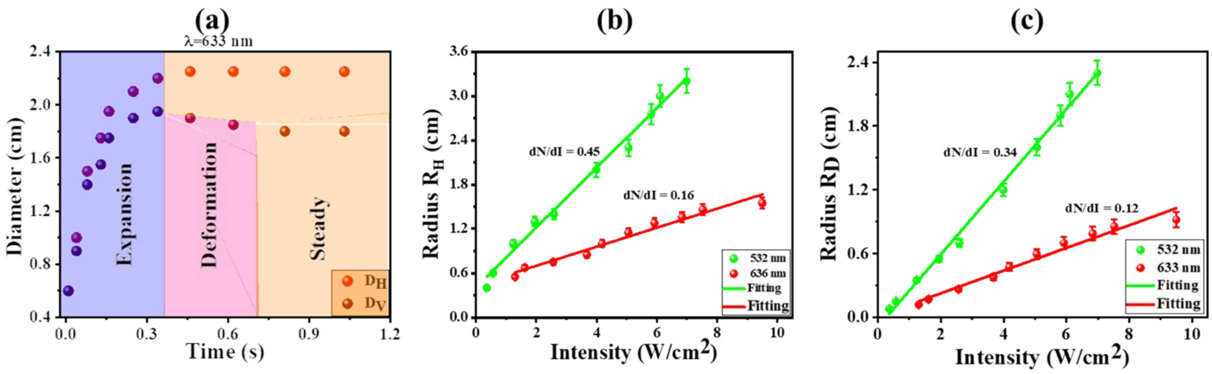

Fig. S3 (a) Modifications in the diffraction rings along the horizontal and vertical diameter in Por-Zn with 633 nm excitation, graph of (b) R_H vs intensity, (c) R_D vs intensity.

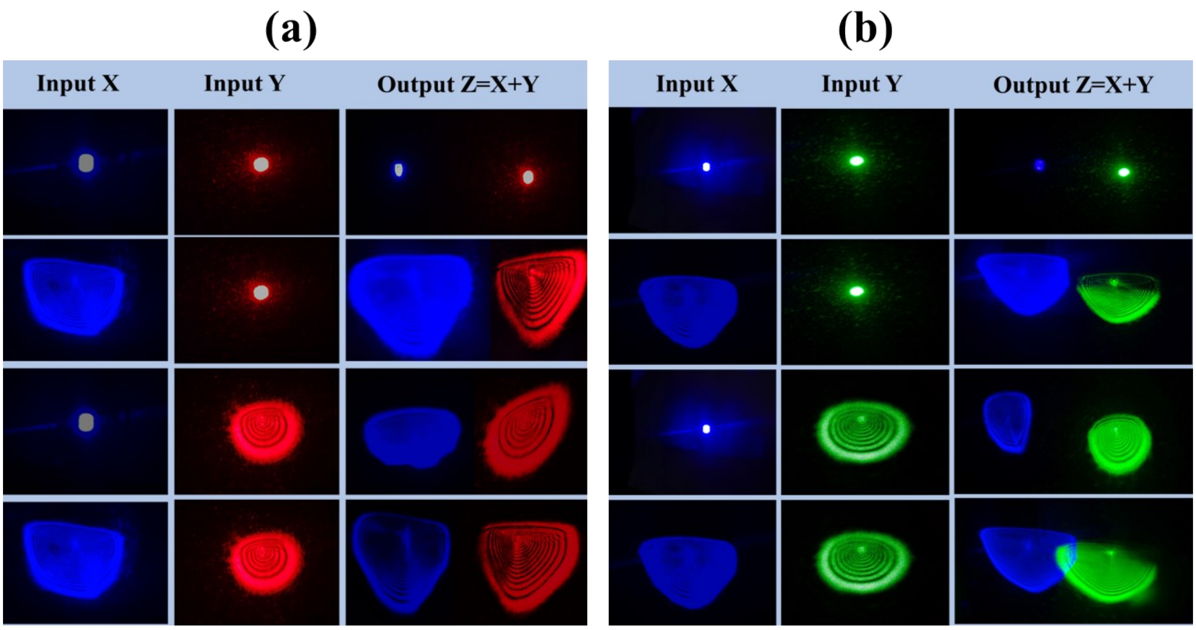

Fig. S4 XPM result using (a) 440 nm and 633 nm lasers, (b) 440 nm and 532 nm in Por-Zn, respectively.

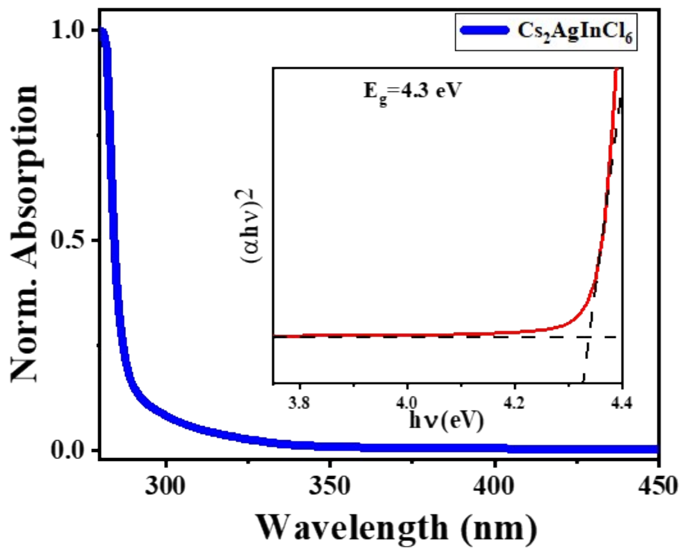

Fig. S5 UV-Vis absorption of $Cs_2AgInCl_6$ NCs. Inset shows the Tauc plot of for bandgap calculation of $Cs_2AgInCl_6$ NCs.

Equation for Fitting linear experimental data and results

The linear experimental data are fitted using linear equation,

$$Y=A+MX,$$

Where Y= Ring number (N) or Radius (R_D, R_H) or angle of distortion (Θ_H, Θ_D)

X= Intensity of laser (I) or time (T)

M= Slope

A= Constant

Results from linear fitting

Fig. 1(e): Number of rings (N) vs Intensity (I) (10 mm pathlength, λ=532 nm laser excitation)

For Por-Zn, dN/dI (slope) = 3.20, R-square = 0.9905

For Por-Ni, dN/dI (slope) = 2.73, R-square = 0.9811

For Por-Cu, dN/dI (slope) = 2.38, R-square = 0.9918

For Por-Fb, dN/dI (slope) = 1.77, R-square = 0.9601

Fig. 1(f): Number of rings (N) vs Intensity (I) (1 mm pathlength, λ=532 nm laser excitation)

For Por-Zn, dN/dI (slope) = 1.20, R-square = 0.9862

For Por-Ni, dN/dI (slope) = 0.70, R-square = 0.9862

For Por-Cu, dN/dI (slope) = 0.64, R-square = 0.987

For Por-Fb, dN/dI (slope) = 0.57, R-square = 0.9785

Fig. 2(c): Number of rings (N) vs Intensity (I) (Por-Zn, 10 mm pathlength, λ=440 nm, 532 nm, 633 nm laser excitations)

For λ = 440 nm, dN/dI (slope) = 4.50, R-square = 0.9957

For λ = 532 nm, dN/dI (slope) = 3.20, R-square = 0.9905

For λ = 633 nm, dN/dI (slope) = 1.28, R-square = 0.9929

Fig. 3(f): angle of distortion (Θ_H vs I) (Por-Zn, λ=532 nm, 633 nm laser excitations)

For λ = 532 nm, dN/dI (slope) = 4.79, R-square = 0.9905

For λ = 633 nm, dN/dI (slope) = 1.51, R-square = 0.9677

Fig. 3(g): angle of distortion (Θ_D vs I) (Por-Zn, λ=532 nm, 633 nm laser excitations)

For λ = 532 nm, dN/dI (slope) = 4.01, R-square = 0.9948

For λ = 633 nm, dN/dI (slope) = 1.25, R-square = 0.9698

Fig 5(g): Number of rings (N) vs time (T) (Por-Zn, λ=532 nm, 633 nm laser excitation, mono wavelength)

For λ = 532 nm, dN/dI (slope) =69.15, R-square = 0.9841

For λ = 633 nm, dN/dI (slope) = 32.41, R-square = 0.9863

Fig 5(h): Number of rings (N) vs time (T) (Por-Zn, λ=532 nm, 633 nm laser excitation, double wavelength)

For pump λ = 633 nm, dN/dI (slope) =50.80, R-square = 0.9862

For λ = 633 nm, dN/dI (slope) = 30.83, R-square = 0.9663

Fig. 7(c): Number of ring (N) vs Intensity (I) (Por-Zn/$Cs_2AgInCl_6$) (λ=532 nm laser excitations)

Forward direction (Por-Zn/$Cs_2AgInCl_6$)

λ= 532 nm, dN/dI (slope) =1.04, R-square = 0.9856

Fig. 7(d): Number of ring (N) vs Intensity (I) (Por-Zn/$Cs_2AgInCl_6$) (λ=633 nm laser excitations)

Forward direction (Por-Zn/$Cs_2AgInCl_6$)

λ= 532 nm, dN/dI (slope) =0.94, R-square = 0.9847

Fig. S3(c): Radius (R_H) vs Intensity (I) (Por-Zn, λ=532 nm, 633 nm laser excitations)

For λ = 532 nm, dN/dI (slope) = 0.45, R-square = 0.9884

For λ = 633 nm, dN/dI (slope) = 0.16, R-square = 0.9664

Fig. S3(d): Radius (R_D) vs Intensity (I) (Por-Zn, λ=532 nm, 633 nm laser excitations)

For λ = 532 nm, dN/dI (slope) = 0.34, R-square = 0.9948

For λ = 633 nm, dN/dI (slope) = 0.12, R-square = 0.9702