Electronic Supplementary Material (ESI) for Materials Advances.

NIR-responsive Porous Gold Nanorod Dispersed in 3D Gelatin Scaffold for Stimuli Responsive Drug Release and Synergistic Therapy

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Electronic supporting Information

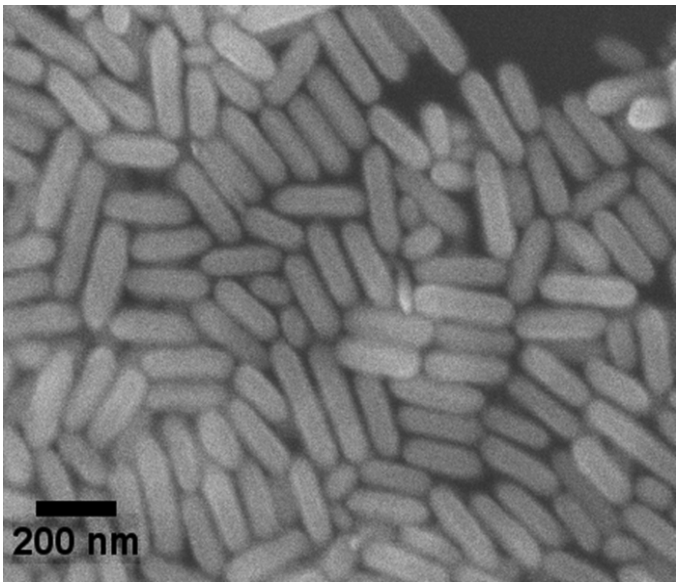

Figure S1 FESEM image of sodium dodecyl sulphate stabilized Se-Te nanorod template.

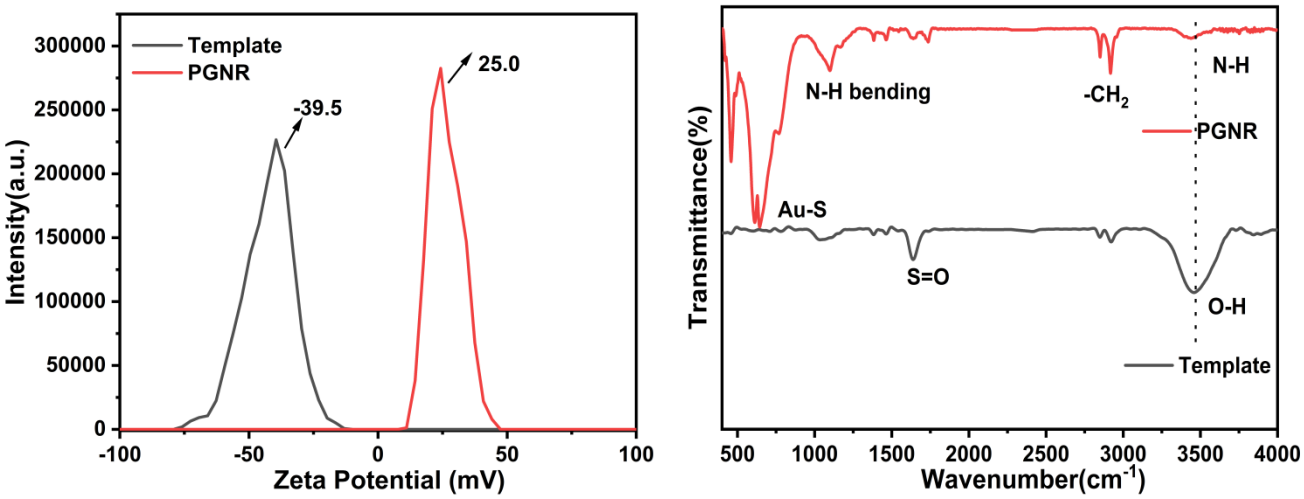

Figure S2, S3 Comparative surface charge, FTIR spectra of aqueous dispersed Se-Te template and cysteamine functionalized PGNR.

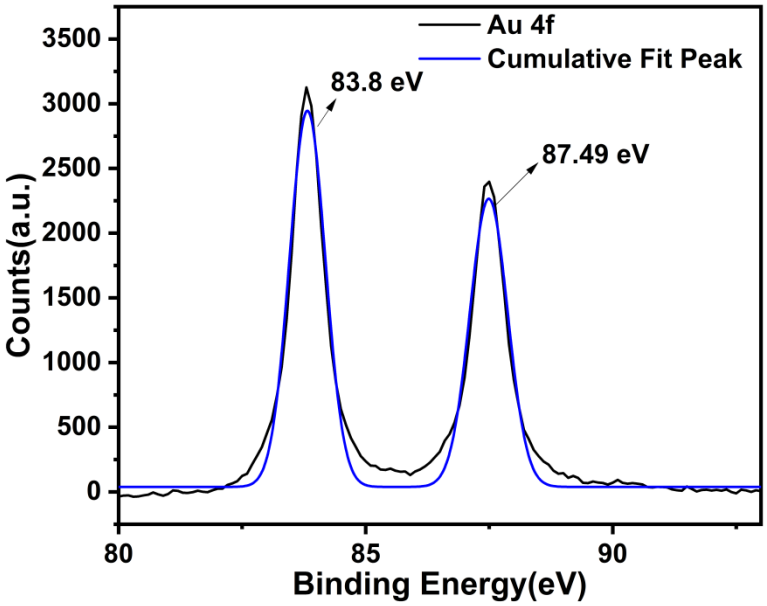

Figure S4 Deconvoluted high resolution Au 4f spectrum

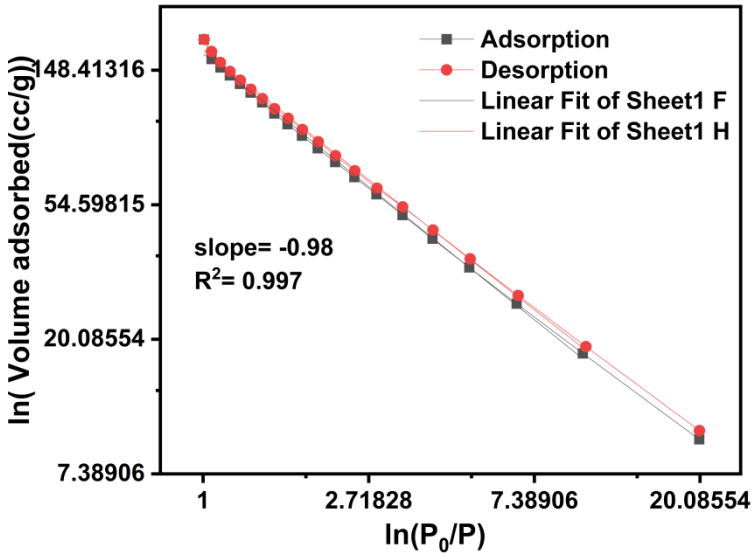

Figure S5 Linearly fitted logarithmic graph of N_2 adsorption-desorption isotherm

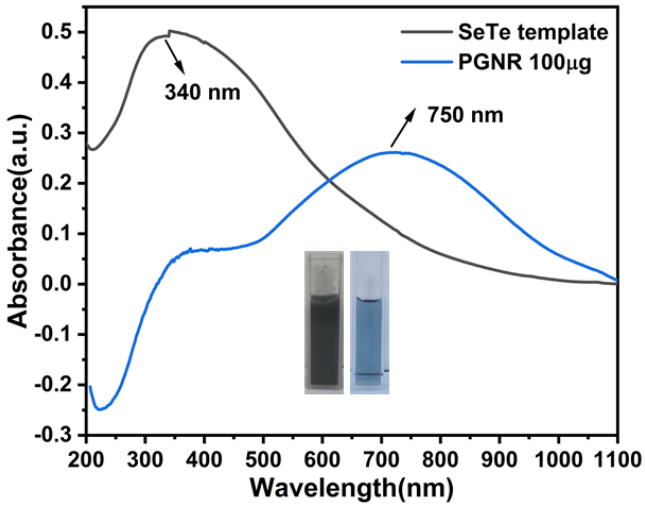

Figure S6 UV-VIS absorption spectra of SeTe nanorod template and porous gold nanorod sample, inset: visual images of corresponding real samples in cuvette

Table S1 Comparative report on few recently reported NIR active photothermal materials and its efficiency

Material	Laser Power	η(%)	Reference
Hollow gold nanosphere	808 nm, 1.5W/cm^2	21.7	ACS Appl. Mater. Interfaces **2017**, 9, 40017−40030
Polydopamine	808 nm, 1W/cm^2	33.4	*ACS Applied Materials & Interfaces* **2018**, 10, 15, 12544-12552
hollow MOF/polydopamine Janus nanoparticles	808 nm, 1W	29.7	Chem. Eng. Journ., **2019**, 378, 1221756
Miniature hollow gold nanorod	1064 nm, 690mW/cm^2	34	*Small* **2020**, *16*, 2002748
Hollow Ag@Au-Ce6 NPs	808 nm, 808mW/cm^2	**33.2**	Biomater. Sci., **2023**, 11, 4874–4889
HAuNS@PEG-bio	1064 nm, 1W	**63**	J. Mater. Chem. B, **2023**,11, 10003-10018
Hollow octahedron Cu_2-xSe nanoparticles	1064 nm, 1W	**55.97**	Nanoscale, **2023**, Advance Article
Cysteamine @PGNR	750 nm, 1W/cm^2	**79.25**	Present study

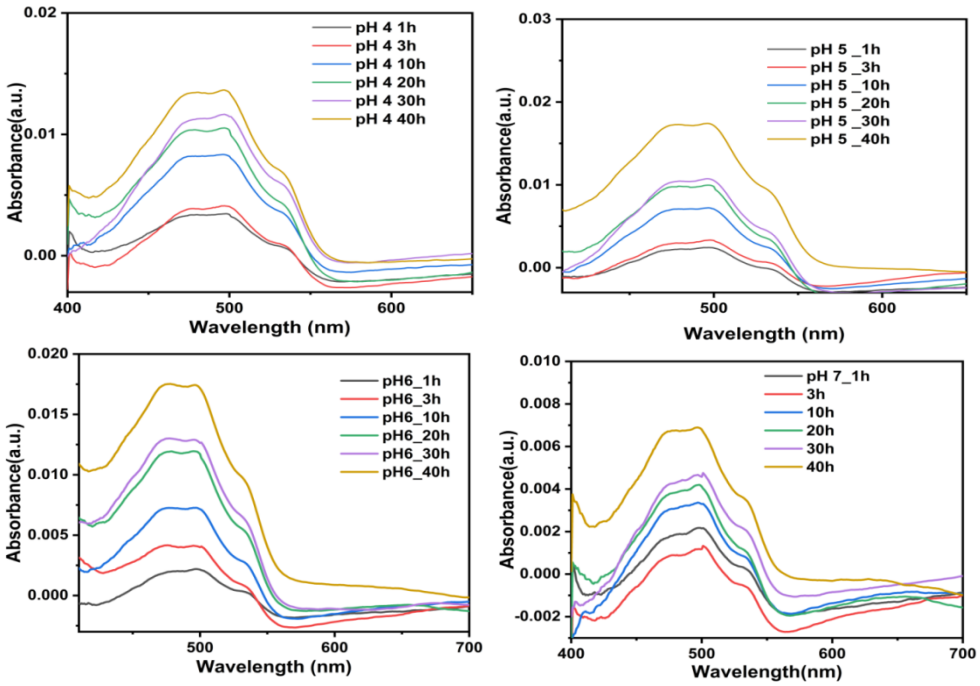

Figure S7 Drug release profile with respect to time for pH 4, 5, 6 and 7

Table S2- Comparative DOX loading capability and encapsulation efficiency in different porous and nonporous material

Porous Nanostructure				**Non-porous Nanostructure**			
Material	**DOX loading (%)**	**Encapsulation Efficiency (%)**	**Release (%)**	**Material**	**DOX loading (%)**	**Encapsulation efficiency (%)**	**Release (%)**
Mesoporous carbon @V_2O_5 (Langmuir 2024, 40, 6471−64)	Not given	88.0	78.0% in 60min	Self-assembled cyclodextrin conjugated gold nanocluster (J. Mater. Chem. B, 2024, 12, 3521–3532)	2.9	92.2	63.0 in 24h
Chitosan stabilized gold core-shell (Adv. Therap. 2024, 7, 2300165)	6.5	87.0	91.0% in 48h	Thiolated-PEG-DOX conjugated gold nanoparticle (ACS Appl. Mater. Interfaces 2017, 9, 8569−8580)	Not given	27.3	91.8 in 132h
Polylactide-co-glycolide (PLG) nanoparticle (Small 2023, 2306726)	Not given	(76.0-89.0) Varies with particle size	40% in 20 min	Fe_3O_4-ßCD-Pep42 (ACS Appl. Bio Mater. 2023, 6, 1019−1031)	5.37	41.38	49.0 in120h
Porous silica coated gold nanorod (ACS Appl. Bio Mater. 2023, 6, 1915−1933)	30.0	93.9	90.0% in 6h	Polymeric nanoparticle conjugated DOX (mPEG-b-PPLGFc@Dox) (Small 2023, 19,	9.1	90.5	80.0 in 72h

				2205024)			
Porous calcite microsphere (Colloids and Surfaces B: Biointerfaces 2020, 186, 110720)	11.0	95.0	56% in 21 days	PAA-PEG-GNRs@DOX (Dalton Trans., 2011, 40, 9789–9794)	Not given	51.0	50.0 in 45 min (acetate buffer)
PEI nanogel-ultrasmall Fe_3O_4 NP (Bioconjugate Chem. 2020, 31, 907−915)	21.9	51.4	44.0% in 72h				
PGNR **(Present work)**	10.0	99.0	72% in 120 min				

Table S3 Comparative IC-50 value for free DOX, PGNR material and DOX loaded therapeutic material

Sample	**IC50 value(µg/mL)**
Doxorubicin (literature)	**13.76**
Free Dox(our finding)	**20**
PGNR+NIR	**100**
PGNR-DOX-gel +NIR	**20 (**2 µg free DOX present in 20µg PGNR-DOX-gel**)**

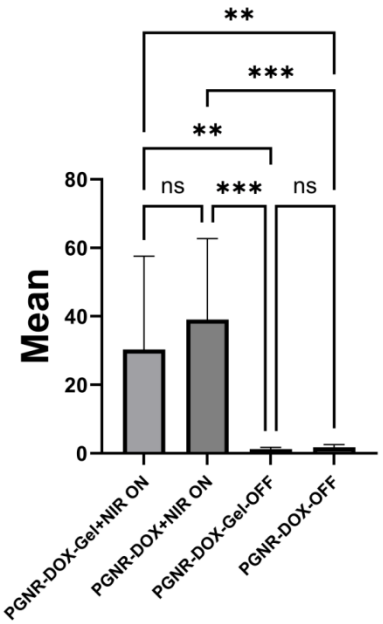

Figure S8 Statistically significant difference in drug release is shown as mean ± S.E. under laser ON and OFF condition (where ** is p=0.0024, *** is p= 0.0001, ns is non-significant)

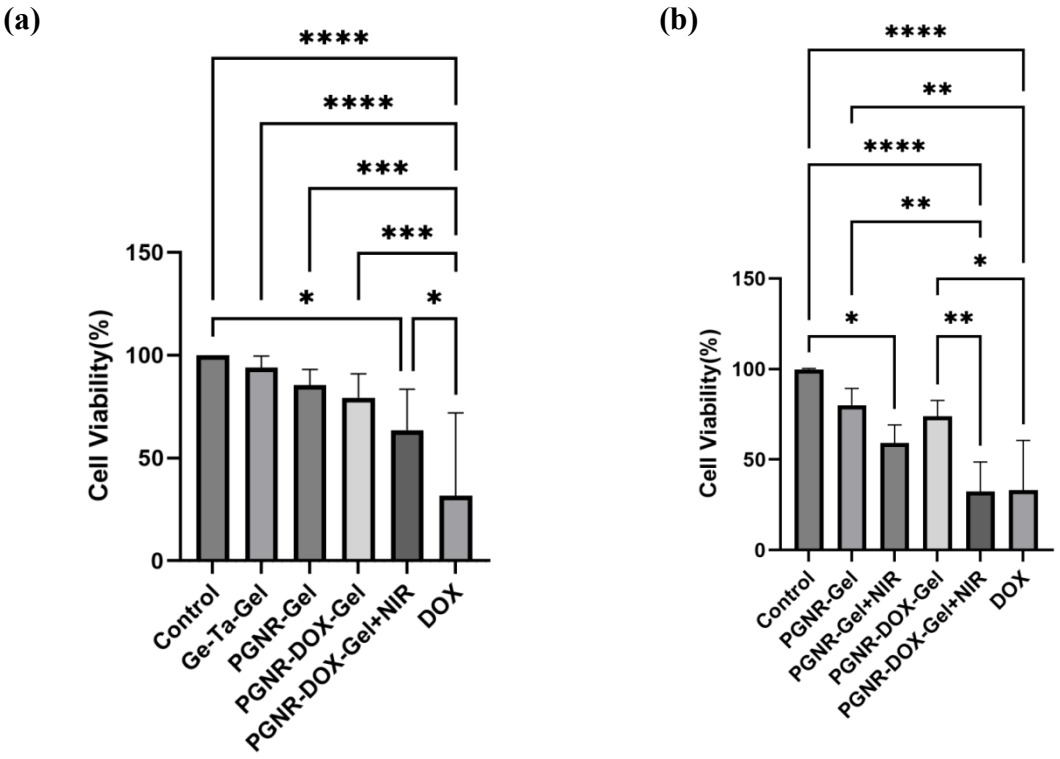

Figure S9 Statistical analysis of the cell viability study obtained from almarBlue assay on (a) L929 cells (b) HeLa cells (* is p= 0.0138, ** is p= 0.0026 , *** is p= 0.0001, **** is p<0.0001)

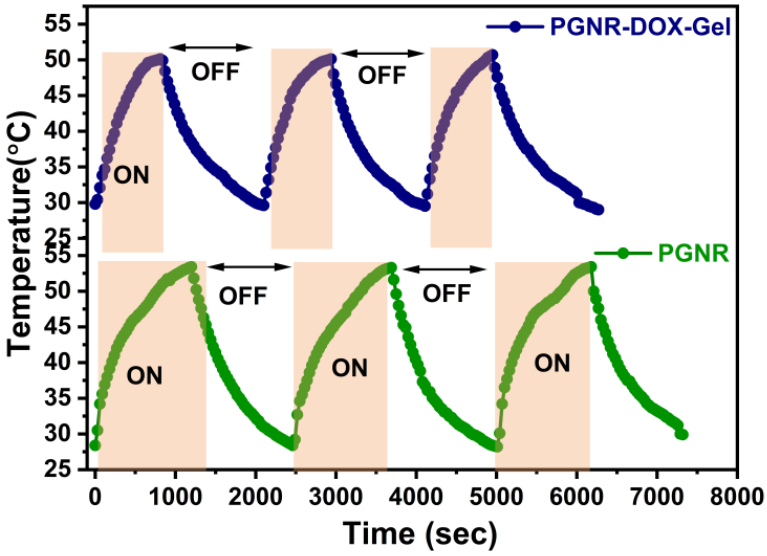

Figure S10 Photothermal stability of PGNR and PGNR-DOX-Gel after 3 consecutive cycles of laser ON and OFF (750 nm, 1W power)

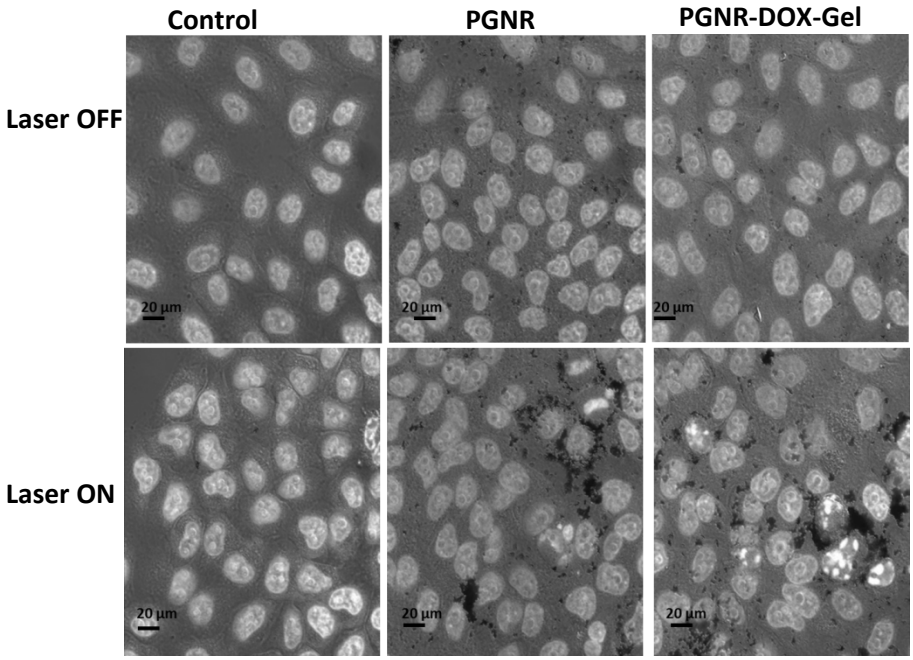

Figure S11 Bright field images of Laser scanning confocal microscopy (corresponds to figure 7)