

Supporting Information

Zn²⁺ induced Folding of RNA to produce Honeycomb like RNA -Mediated Fluorescing Zn²⁺/PbSe Nanostructures

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Figure S1a. Depth profile along X-axis in fresh SP1.



Figure S1b. Depth profile along Y-axis in fresh SP1.

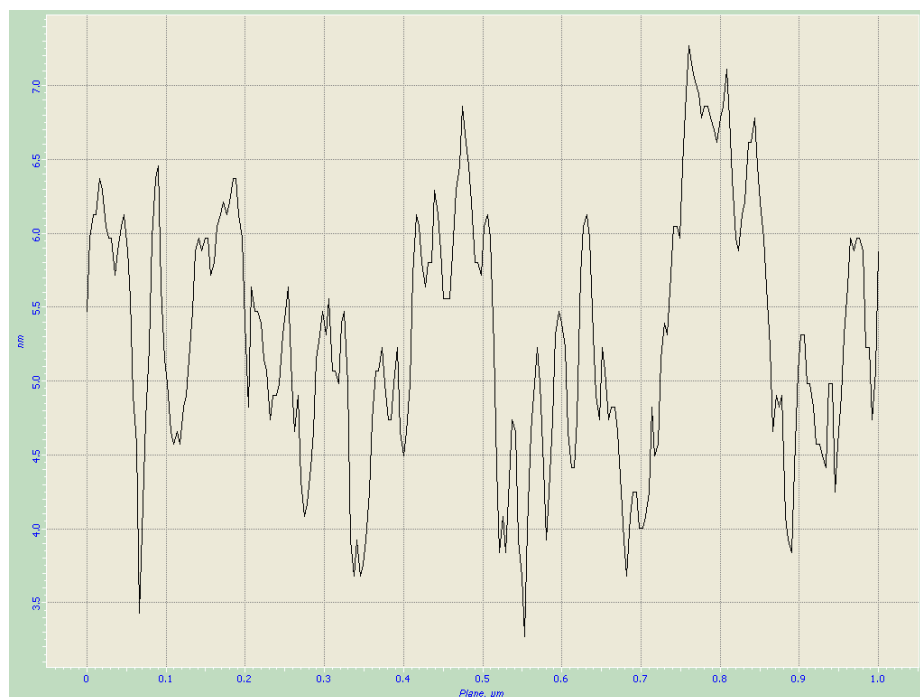


Figure S1c. Depth profile along X-axis in aged SP1.



Figure S1d. Depth profile along Y-axis in aged SP1.

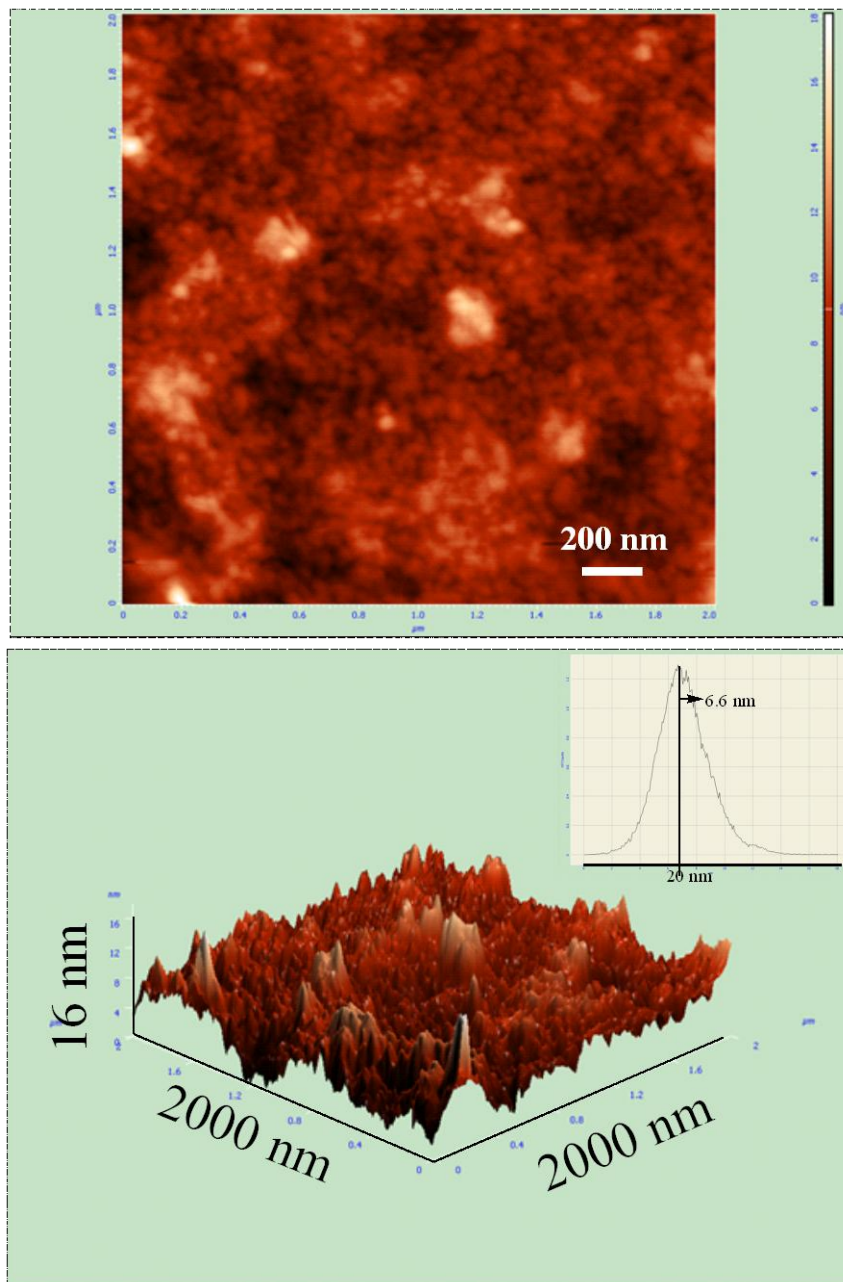


Figure S2a. 2D and 3D AFM images of RNA mediated PbSe containing $[\text{Zn}^{2+}] = 1 \times 10^{-5} \text{ mol dm}^{-3}$; Inset: Roughness histogram.

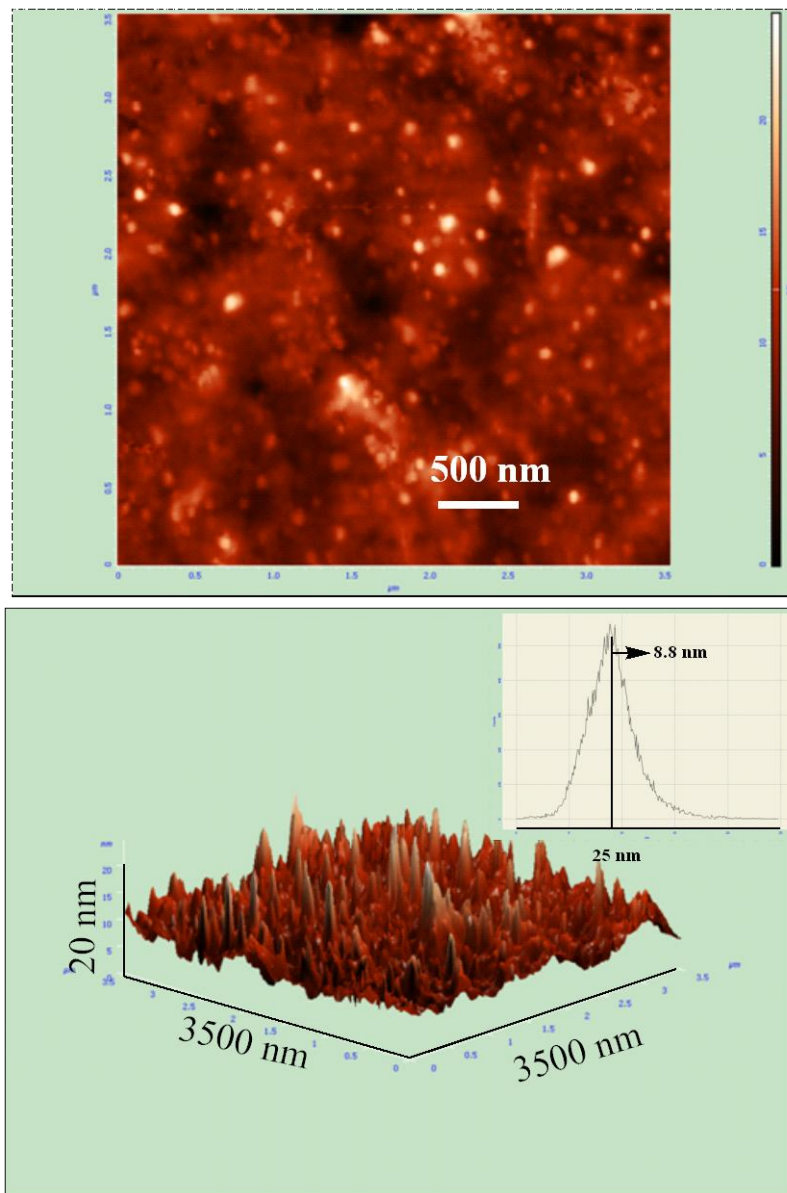


Figure S2b. 2D and 3D AFM images of PbSe containing $[\text{Zn}^{2+}] = 2.5 \times 10^{-5} \text{ mol dm}^{-3}$; Inset: Roughness histogram.

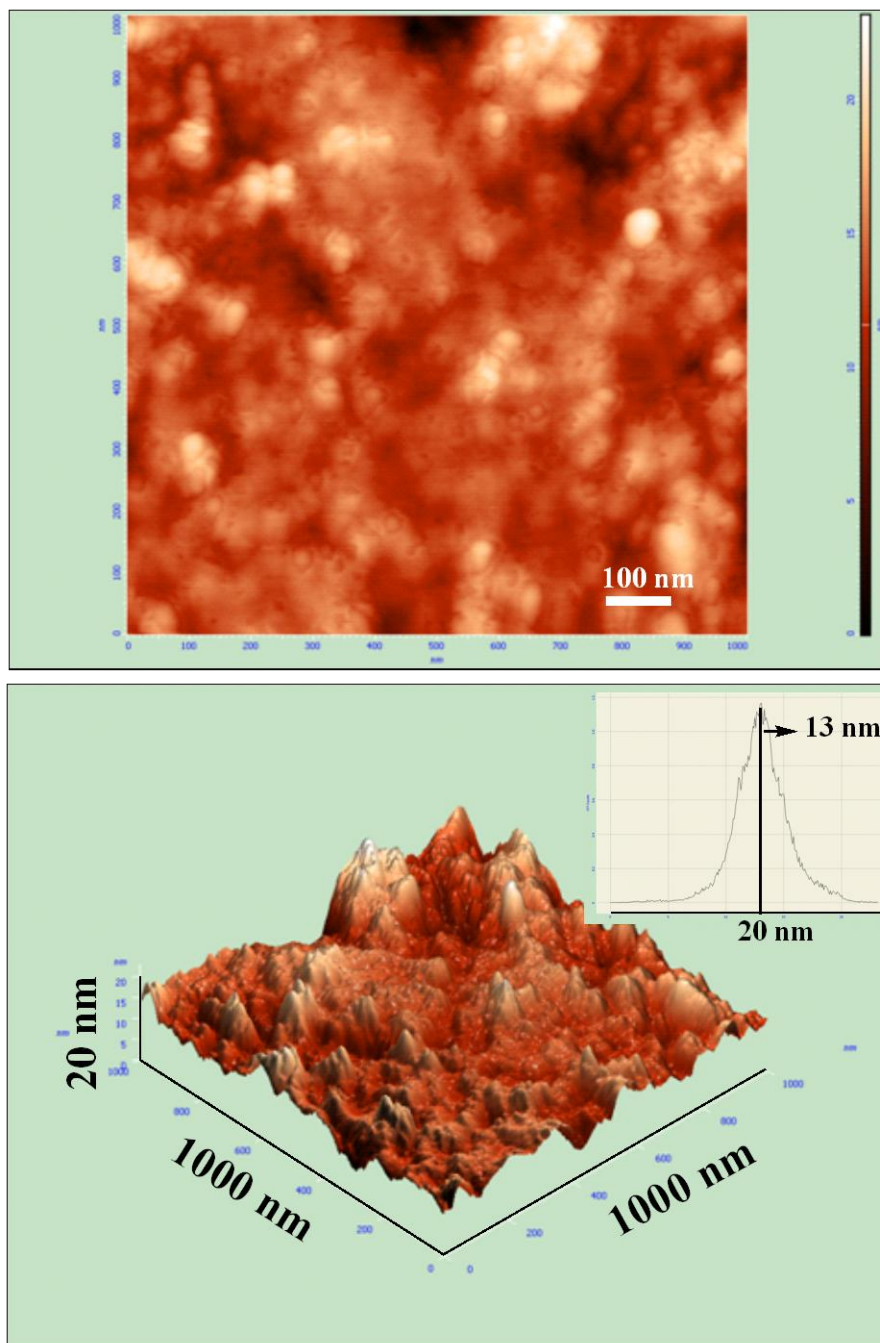


Figure S2c. 2D and 3D AFM images of RNA mediated PbSe containing $[\text{Zn}^{2+}] = 5 \times 10^{-5} \text{ mol dm}^{-3}$; Inset: Roughness histogram.

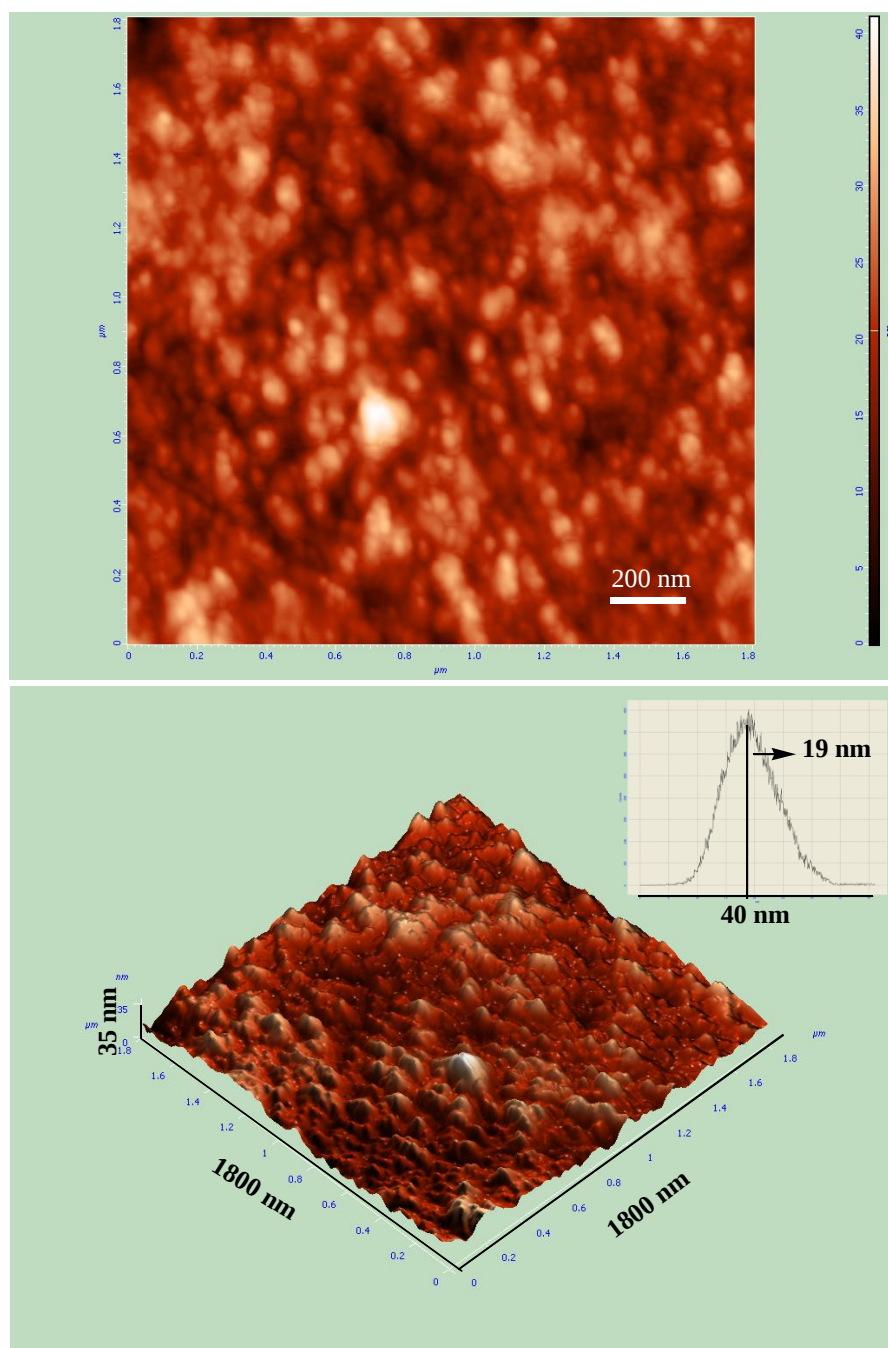


Figure S2d. 2D and 3D AFM images of RNA mediated PbSe containing $[\text{Zn}^{2+}] = 15.0 \times 10^{-5} \text{ mol dm}^{-3}$; Inset: Roughness histogram.

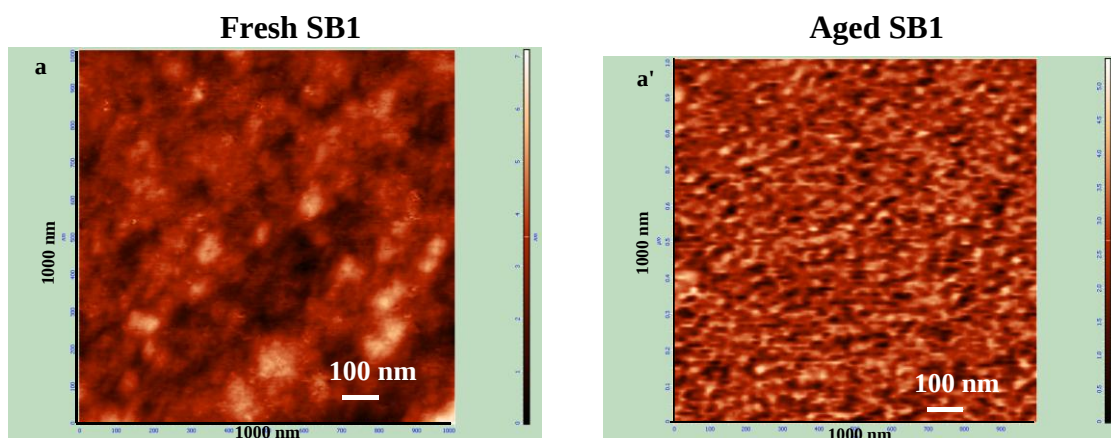


Figure S3A. 2D AFM images of SB1: Fresh (a); Aged (a')

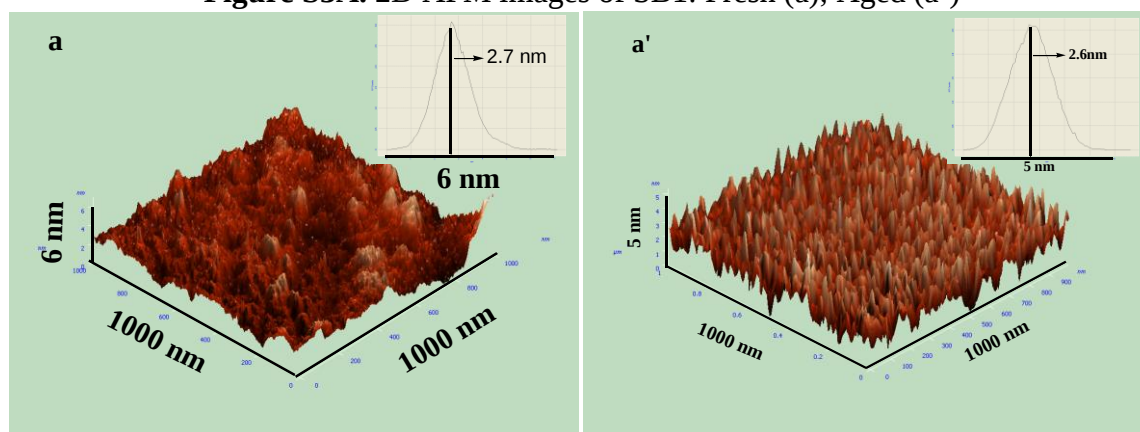


Figure S3B. 3D AFM images of SB1: Fresh (a); Aged (a') Inset: Roughness histogram.

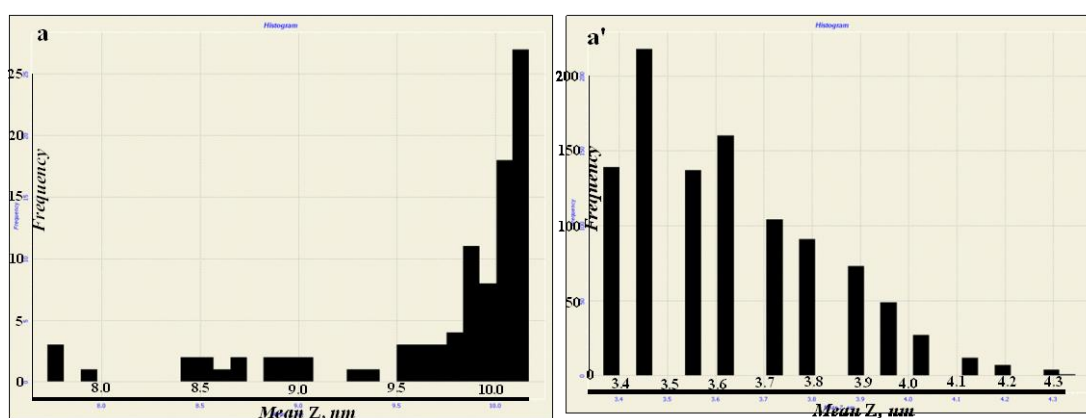
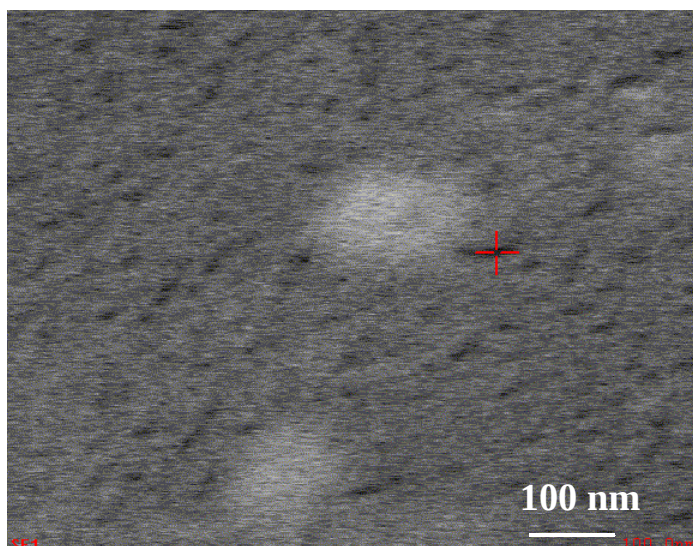


Figure S3C. Histogram showing pores/ grains analysis of SB1: Fresh (a); Aged (a').



<i>Element</i>	<i>Wt%</i>	<i>At%</i>
<i>CK</i>	63.33	84.54
<i>NK</i>	11.09	12.69
<i>SeL</i>	03.47	00.70
<i>ZnK</i>	02.11	00.52
<i>PbL</i>	20.00	01.55
<i>Matrix</i>	Correction	ZAF

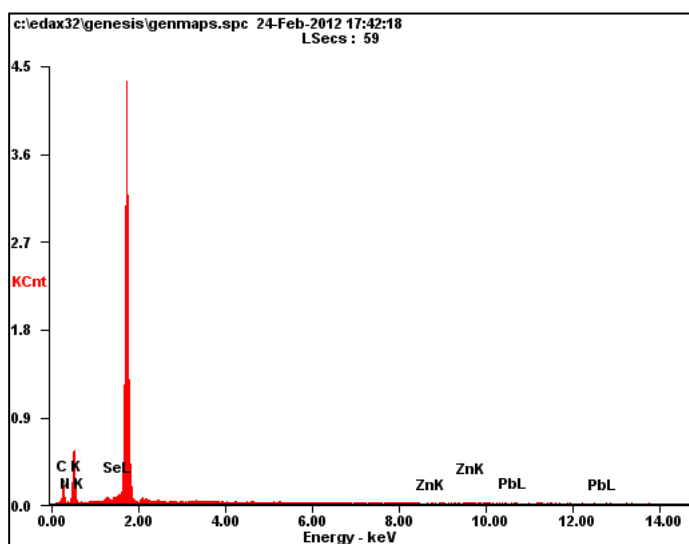
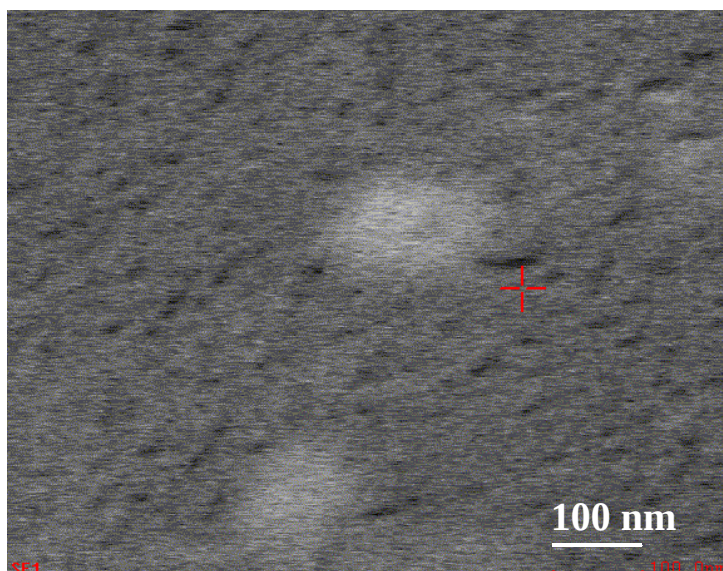


Figure S4a. EDAX analysis of FESEM images of fresh SP1.



<i>Element</i>	<i>Wt%</i>	<i>At%</i>
<i>CK</i>	69.28	85.67
<i>NK</i>	11.57	12.27
<i>SeL</i>	03.29	00.62
<i>ZnK</i>	01.95	00.44
<i>PbL</i>	13.91	01.00
<i>Matrix</i>	Correction	ZAF

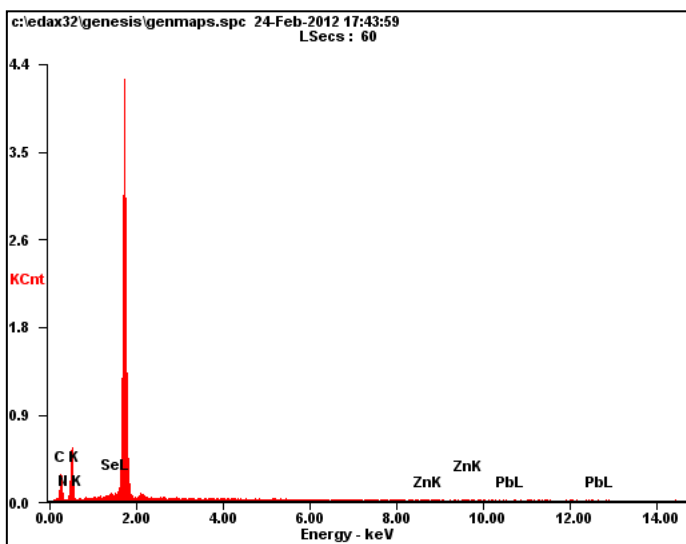
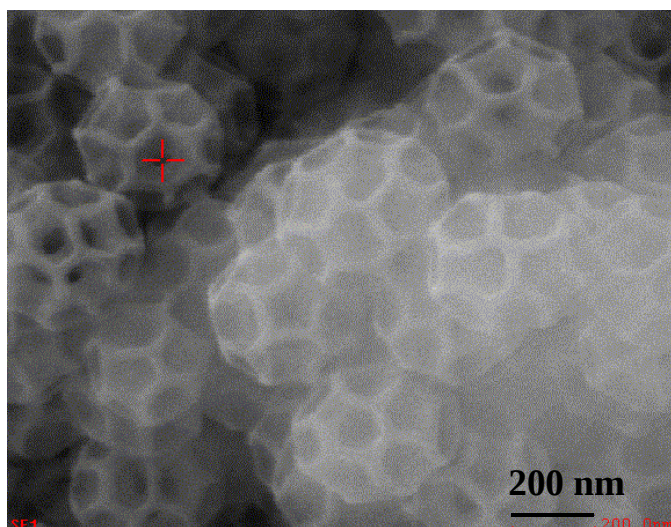


Figure S4b. EDAX analysis of FESEM images of fresh SP1.



<i>Element</i>	<i>Wt%</i>	<i>At%</i>
<i>CK</i>	50.51	67.13
<i>NK</i>	24.61	28.05
<i>ZnL</i>	08.04	01.96
<i>SeL</i>	05.39	01.09
<i>PK</i>	02.03	01.05
<i>PbM</i>	09.42	00.73
<i>Matrix</i>	Correction	ZAF

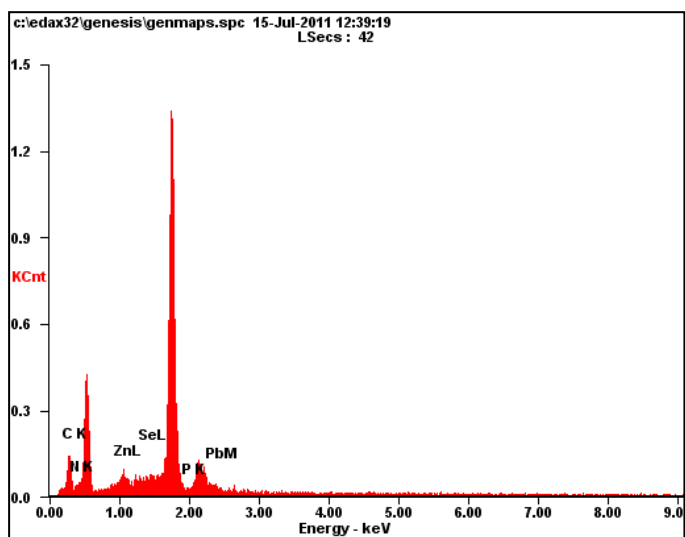
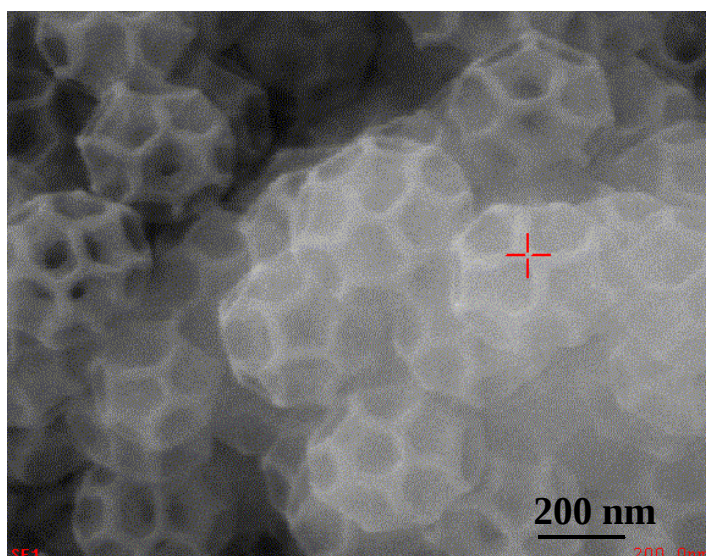


Figure S4c. EDAX analysis of FESEM images of aged SP1.



<i>Element</i>	<i>Wt%</i>	<i>At%</i>
<i>CK</i>	57.77	74.33
<i>NK</i>	18.83	20.77
<i>ZnL</i>	13.76	03.25
<i>SeL</i>	01.66	00.33
<i>PK</i>	01.71	00.85
<i>PbM</i>	06.26	00.47
<i>Matrix</i>	Correction	ZAF

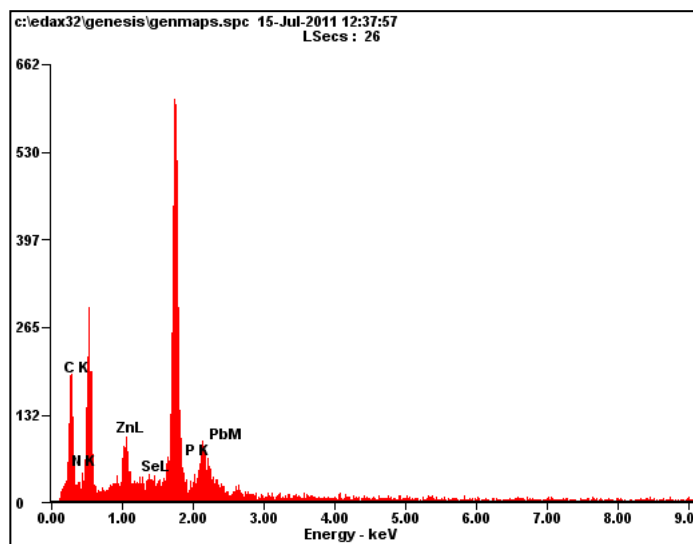


Figure S4d. EDAX analysis of FESEM images of aged SP1.

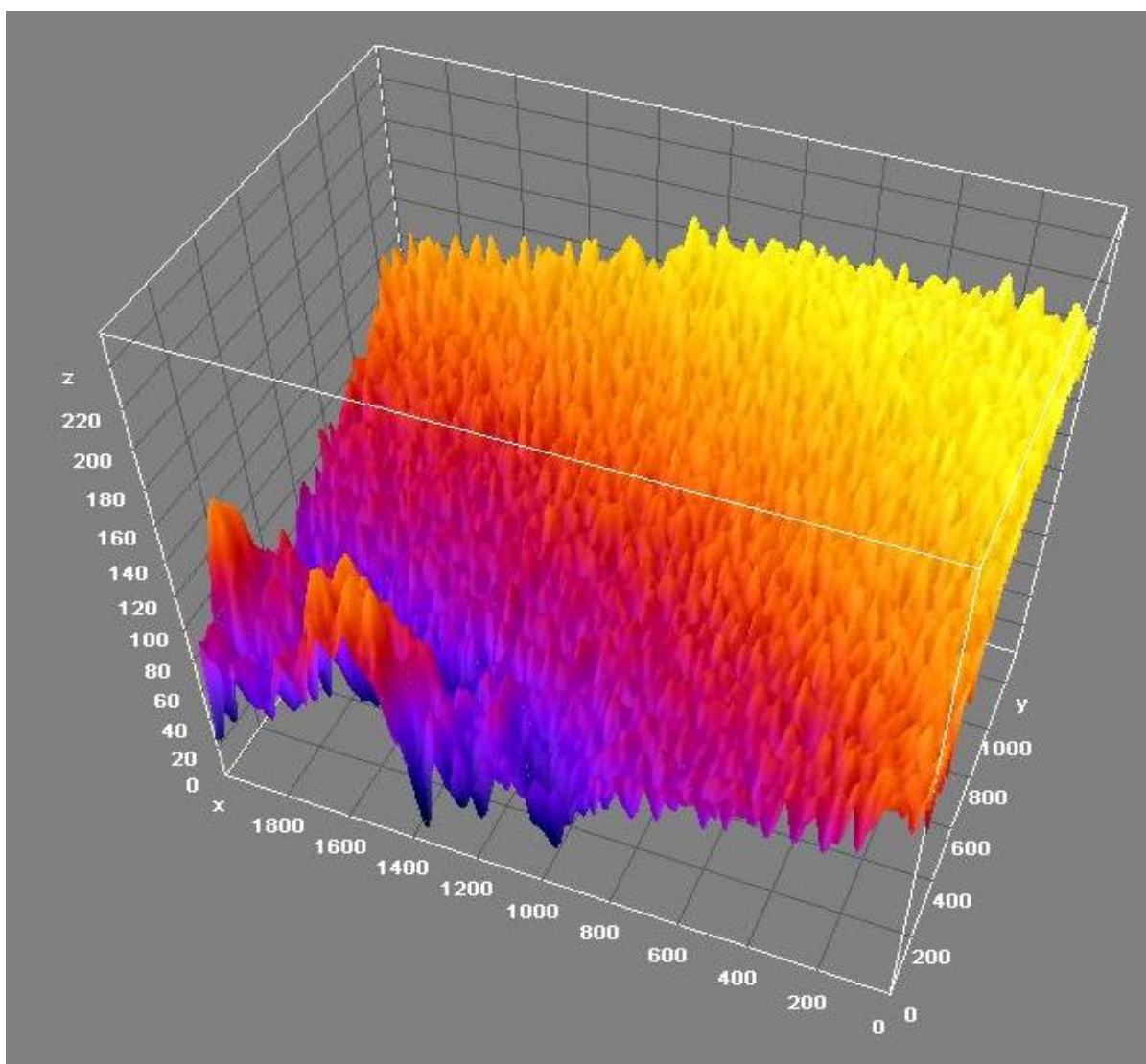


Figure S5a. 3D view of TEM image of Fresh SP1 recorded with the help of *image J* software.

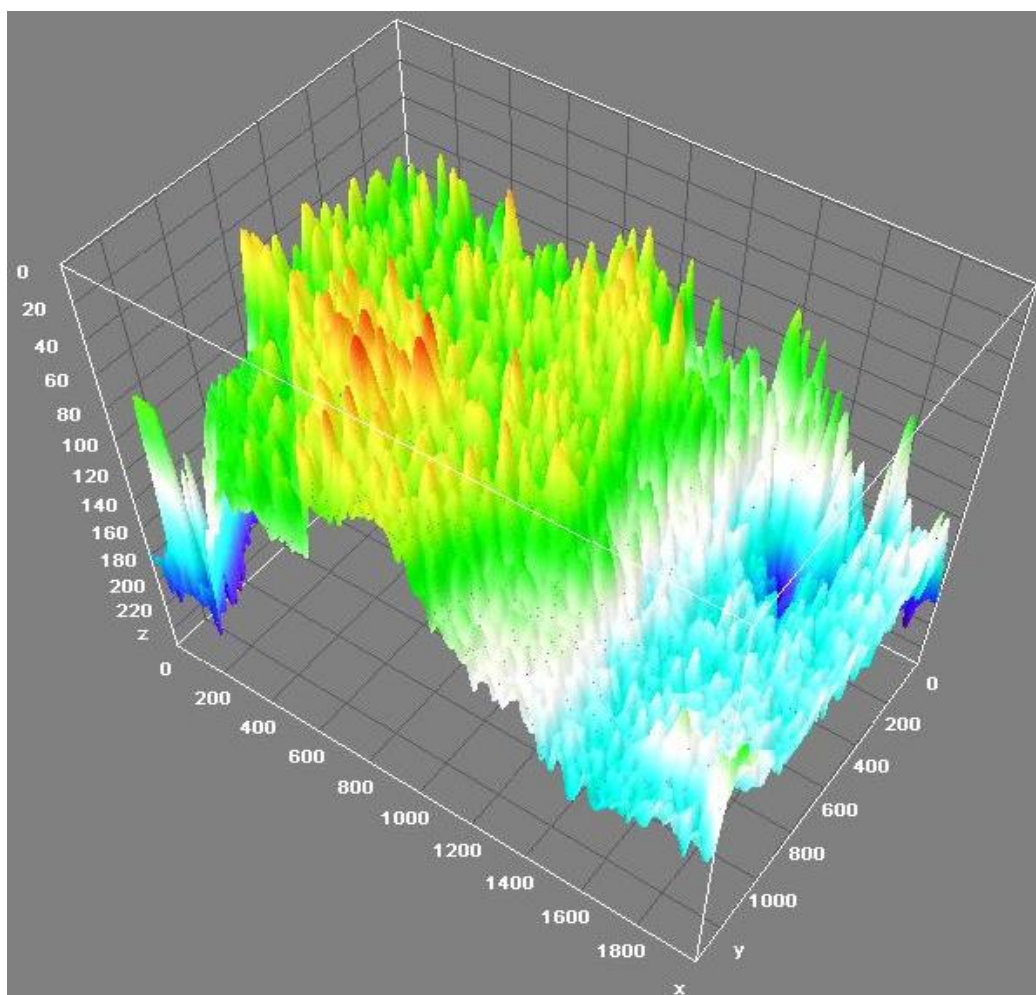
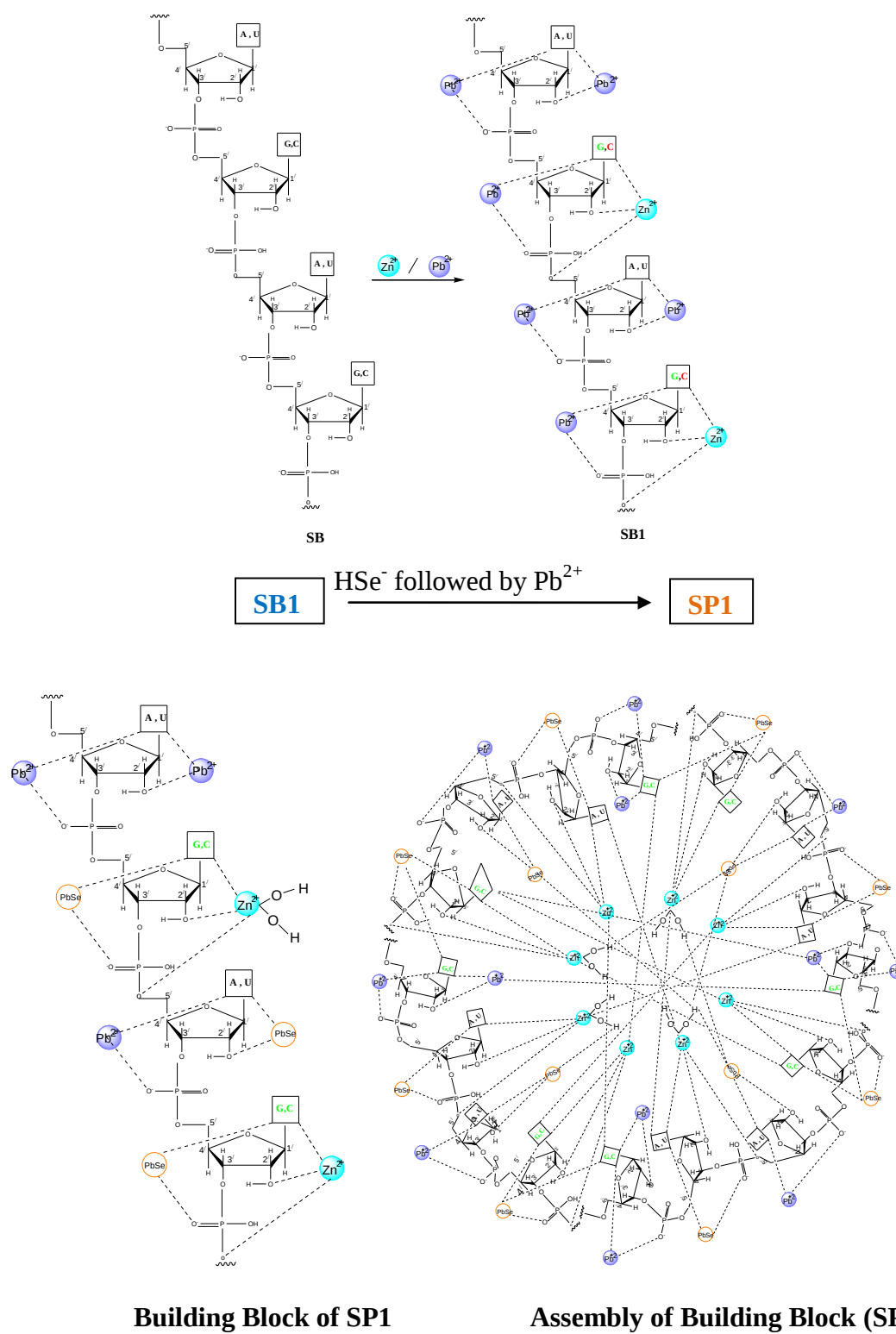


Figure S5a'. 3D view of TEM image of aged SP1 recorded with the help of *imageJ* software.



Scheme S1. Interactions of RNA in the absence (SB1) and presence of PbSe (SP1) forming Building Block and their Assembly.

Table S1. XPS spectral data

Sample	Peaks /orbital	B.E. (eV) Literature in reference to PbSe	B.E. (eV) Observed
Zn²⁺/PbSe	Pb 4f _{7/2} Pb 4f _{5/2}	142.5 137.3	141.2 136.4
Zn²⁺/PbSe	Se 3d _{5/2} Se 3d _{3/2}	53.3 54.18	51.2 54.1
Pb(OH)₂ in Zn²⁺/PbSe	O1s	530.8	529.1
Zn(OH)₂	O1s	532.3	534.0

Table S2. Depth and hole/pore analysis of SP1 in AFM images shown in Figure 4.

Sample	No. of pores	Size of pore (nm)	Depth along X-axis (nm)	Depth along Y-axis(nm)	Surface roughness (nm)
SP1(Fresh)	139	4.3	1-3	3.0	5.2
SP1(Aged)	305	5.3	1.5-3	4.0	5.4

Table S3. Depth and pore/ grain analysis of SB1 in AFM images shown in Figure S3a.

Sample	No. of pores / grains	Size of pores / grains (nm)
SB1(Fresh)	96 pores	11.1
SB1(Aged)	1022 grains	3.3

Table S4. Mid IR spectral data of SB, SB1, and SP1.

Moiety/Functional group	Vibrational bands in cm ⁻¹		
	SB	SB1	SP1
In plane vibrations: G&U	1693 (br)	disappeared	disappeared
A&C	1642 (m)	1644(br)	1649 (s)
G	1544 (m)	disappeared	disappeared
U (medium)	1469 (m)	1488(br)	1492 (sh)
In plane C2'-OH	1421(br)	1414 (br,m)	1411(s)
Purine in anti confm.	1385(s)	disappeared	disappeared
Purine in syn confm.	1360 (sh)	1340 (br)	1340 (m)
C	1281 (sh)	1281(br)	disappeared
Assym. Stretch PO ₂ ²⁻	1227 (s,br)	1244 (m,br)	1242(m,br)
CO stretch of backbone	1070(s)	1084(br, sh)	1089(m)
Ribose vib. due to 2'-OH	996 (br)	disappeared	disappeared
RNA backbone	966 (m)	966 (br)	970(sh)

s-strong; m- medium; w- weak; sh- shoulder; br- broad.

Table S5. ^1H NMR and ^{31}P NMR spectral data of SB, SB1, and SP1:

Moieties	Chemical Shift (δ) (ppm)		
	(SB)*	SB1	SP1
	RNA	RNA- Zn^{2+} + Pb^{2+}	RNA- Zn^{2+} /PbSe
Sugar protons (H_2' , H_3' , H_4' , H_5' , H_5'')	4.05 - 4.08	4.35 -3.41	4.49 -3.75
bases and sugar protons (H_1' , H_5)	6.11-6.33	5.70 – 5.98	5.83-6.07
aromatic protons of purine and pyrimidine bases (H_2 , H_8 , H_6)	7.63 -8.66	7.63-8.33	7.65-8.46
Sugar 2'-OH	2.41	1.80	1.93
^{31}P	-0.89	-0.84	-0.82

*Ref. 14

Table S6. CD spectral data of SB, SB1, and SP1:

Sample	Peak 1	Peak 2	Peak 3
SB1 Fresh	X = 211.98, Y = -3.35	X = 241.77, Y = -1.68	X = 272.55, Y = 3.34
SP1 Fresh	X = 209.28, Y = -3.50	X = 242.10, Y = -1.48	X = 271.86, Y = 3.59
SP1 Aged	X = 207.99, Y = -0.73	X = 240.42, Y = -1.08	X = 271.53, Y = 2.81

X =Wavelength (nm), Y= Ellipticity

