Supporting Information

Regulating the morphology and luminescence properties of $CsPbBr_3$ perovskite quantum dots through the rigidity of glass network structure

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Table S1. GeO_2/SiO_2 based inorganic glass compositions of (38-*x*)GeO_2-*x*SiO_2-34B_2O_3-5Al_2O_3-4ZnO-5SrO-8Cs_2O-3$PbBr_2$-3NaBr (*x* = 0~38, in mol%), glass-related component, melting temperature and crystallization condition for fabricating $CsPbBr_3$ QDs@glass samples. The resultant appearance, luminescence and photoluminescent quantum yield (PLQY) are tabulated.

SiO_2 contents (mol%)	Melting condition	Crystallization condition	Appearance & luminescence	PLQY (%)
***x* = 0**	1050 °C/30 min	460 °C/10 h	MediumSpringGreen/Transparent; Green/homogeneous	**43.54**
***x* = 9.5**	1050 °C/30 min	490 °C/10 h	MediumSpringGreen/Transparent; Green/homogeneous	**37.90**
	1075 °C/30 min	490 °C/10 h	MediumSpringGreen/Transparent; Green/inhomogeneous	28.23
***x* = 19**	1050 °C/30 min	500 °C/10 h	Primrose/Translucent; Green/homogeneous	13.49
	1100 °C/30 min	500 °C/10 h	MediumSpringGreen/Transparent; Green/homogeneous	13.66
	1115°C/30 min	500 °C/10 h	MediumSpringGreen/Transparent; Green/homogeneous	24.09
	1125 °C/30 min	500 °C/10 h	MediumSpringGreen/Transparent; Green/homogeneous	**36.32**
	1150 °C/30 min	500 °C/10 h	MediumSpringGreen/Transparent; Green/inhomogeneous	35.81
***x* = 28.5**	1050 °C/30 min	510 °C/10 h	Yellow/opaque; Green/homogeneous	5.55
	1165 °C/30 min	510 °C/10 h	MediumSpringGreen/Transparent; Green/homogeneous	**19.45**
	1175 °C/30 min	510 °C/10 h	MediumSpringGreen/Transparent; Green/homogeneous	18.16
	1200 °C/30 min	510 °C/10 h	MediumSpringGreen/Transparent; Green/inhomogeneous	——
***x* = 38**	1200 °C/30 min	520 °C/10 h	MediumSpringGreen/Transparent; Green/homogeneous	**17.58**

Table S2. Melting temperatures and optimal crystallization temperatures of different types of QDs-embedded glasses.

Type of QDs andGlass matrix	Melting Temp. (°C)	Opt. Crystallization Temp. (°C)	Ref.
$CsPbBr_3$/borosilicate glass	1200	470	26
$CsPbBr_3$/phosphosilicate glass	1100	450	27
$CsPbBr_3$/germanate glass	1050	460	28
$CsPbBr_3$/tellurium borate glass	650	280	12

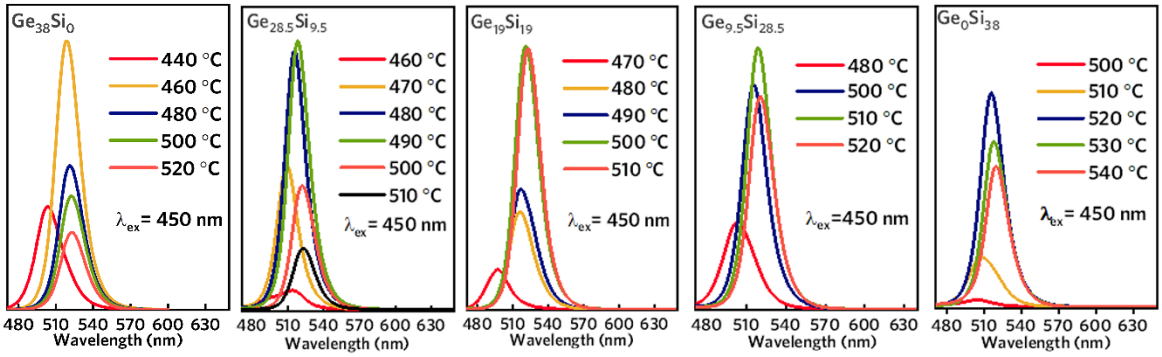

Fig. S1. Photoluminescent (PL) spectra of $Ge_{38}Si_0$, $Ge_{28.5}Si_{9.5}$, $Ge_{19}Si_{19}$, $Ge_{9.5}Si_{28.5}$ and Ge_0Si_{38} specimens heat-treated at 440~540 °C for 10 h. (from left to right: $Ge_{38}Si_0$, $Ge_{28.5}Si_{9.5}$, $Ge_{19}Si_{19}$, $Ge_{9.5}Si_{28.5}$ and Ge_0Si_{38})

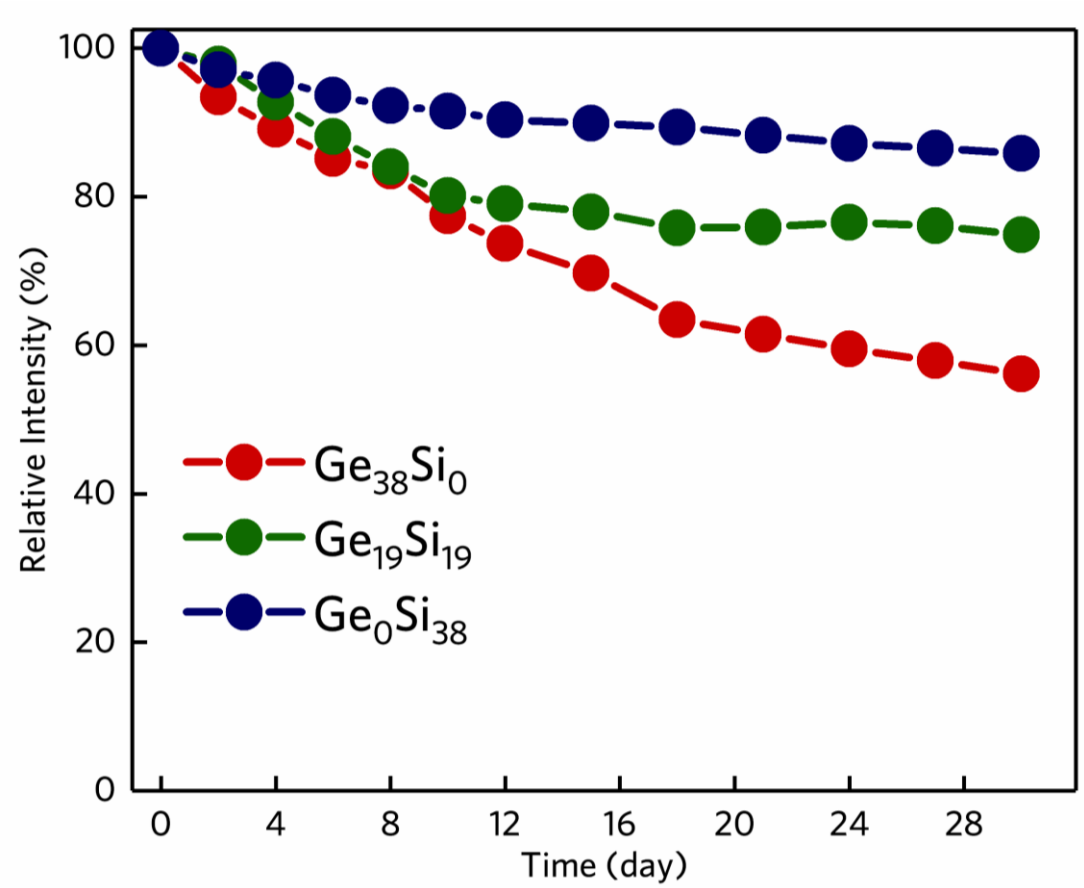

Fig. S2. Water-resistance testing. The quantified result of PL integrated intensity of $Ge_{38}Si_0$, $Ge_{19}Si_{19}$, and Ge_0Si_{38} immersing into deionized water for 30 days.

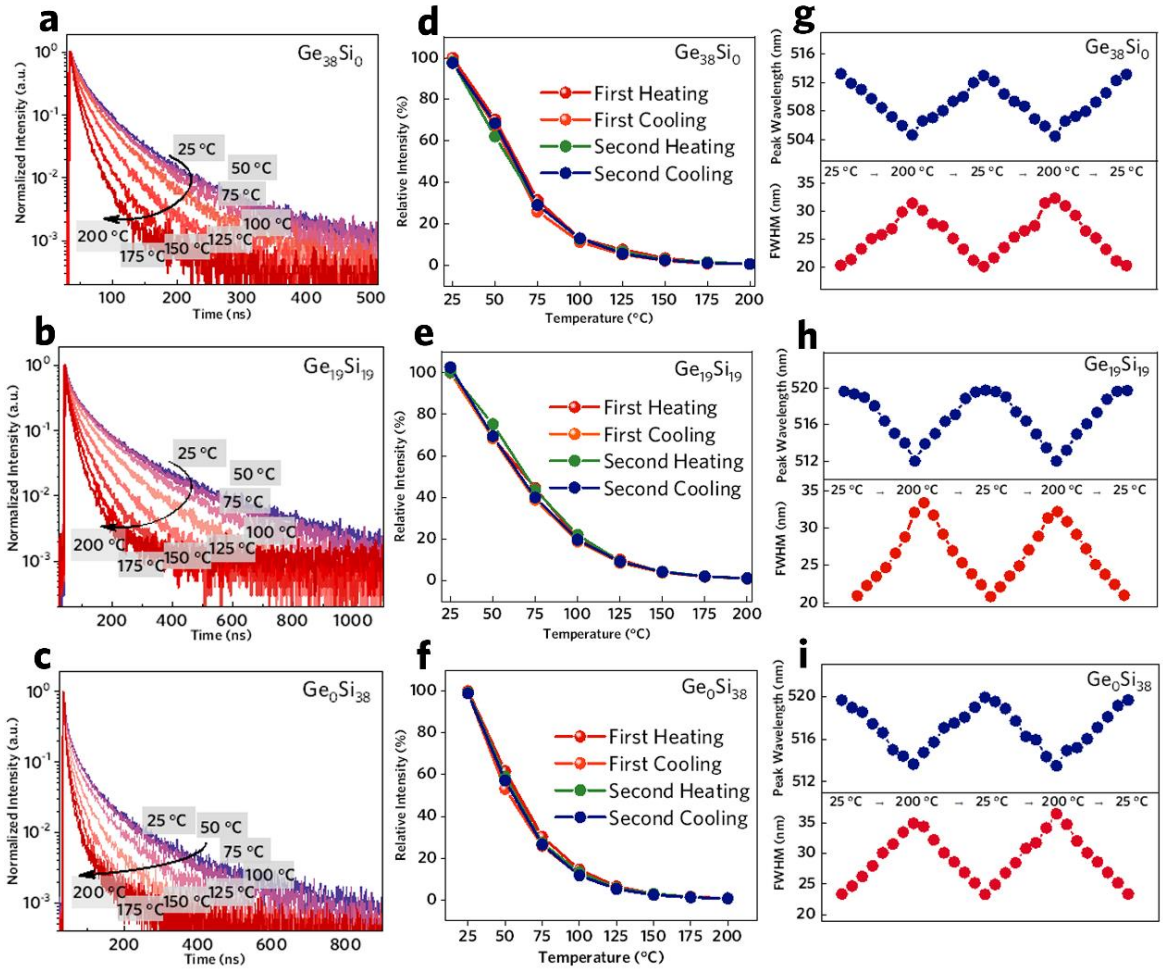

Fig. S3. Temperature-dependent decay-time of a) $Ge_{38}Si_0$, b) $Ge_{19}Si_{19}$, and c) Ge_0Si_{38} samples. Temperature-dependent integrated PL intensity of a) $Ge_{38}Si_0$, b) $Ge_{19}Si_{19}$, and c) Ge_0Si_{38} samples. Temperature-dependent peak wavelength and FWHM of a) $Ge_{38}Si_0$, b) $Ge_{19}Si_{19}$, and c) Ge_0Si_{38} samples.

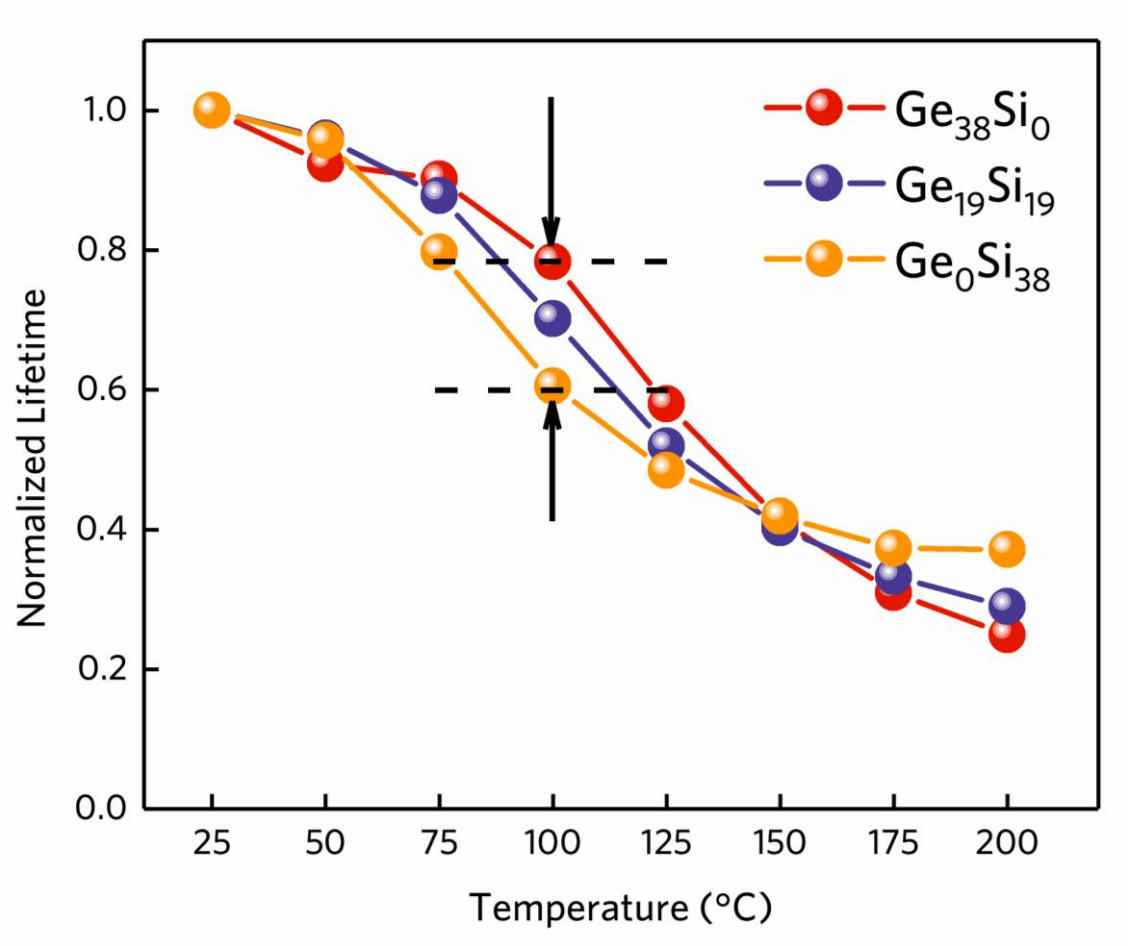

Fig. S4. The variation of average lifetime as a function of temperature.

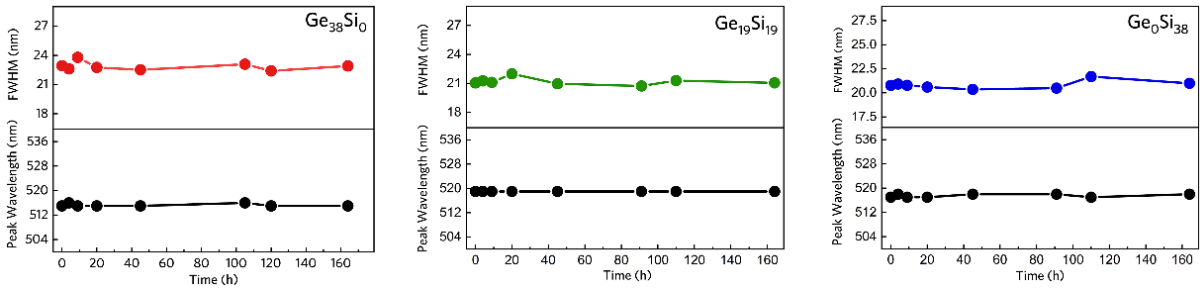

Fig. S5. Photostability testing. Variations in peak wavelength and FWHM of (a) $Ge_{38}Si_0$, (b) $Ge_{19}Si_{19}$, and (c) Ge_0Si_{38} samples.

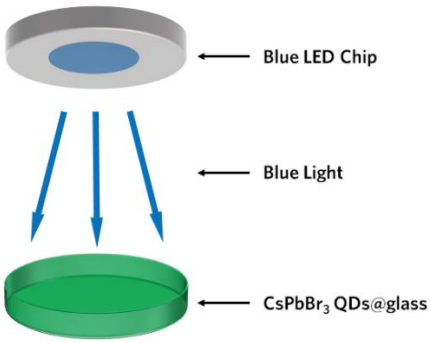

Fig. S6. The schematic diagram of photostability test using 3 W 450 nm LED chip as light source.