Electronic Supplementary Material (ESI) for Materials Advances.

Supplementary Informations

Locally-ordered A-site vacancy assisted photoluminescence enhancement in simply rare-earth doped perovskite oxide

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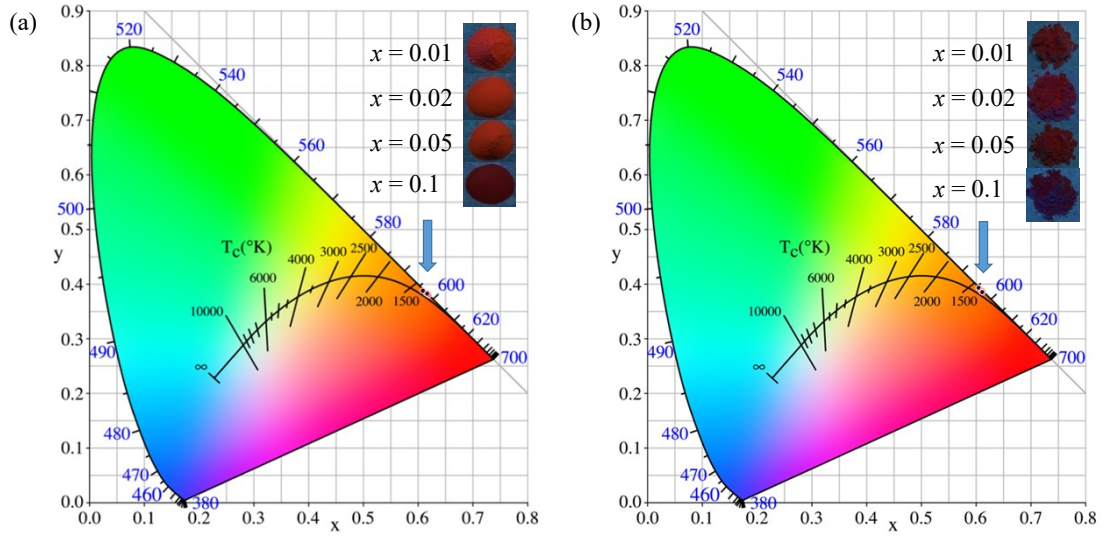

Figure S1. The CIE chromaticity coordinates of (a) V_A-CST-*x* and (b) CST-*x* (*x*=0.01, 0.02, 0.05 and 0.1) samples excited at 408 nm, respectively. It can be seen that the emission colors are located in the reddish-orange region of the standard CIE diagram, consistent with the results from the PL emission spectra (Figure 1b,d). The luminescence features (color purity in Table S1) of V_A-CST-*x* displays much better than those of CST-*x*.

Table S1. Parameters of photoluminescence features (CIE, and CP) of V_A-CST-*x* and CST-*x* (*x*=0.01, 0.02, 0.05 and 0.1) samples.

Samples	Doping level (*x*)	Chromaticity coordinates		Color purity (CP) (%)
		x	y	
V_A-CST-*x*	0.01	0.6195	0.3798	78.82
	0.02	0.6164	0.3829	78.23
	0.05	0.6167	0.3825	78.27
	0.1	0.6101	0.3881	76.98
CST-*x*	0.01	0.6050	0.3927	76.02
	0.02	0.6104	0.3872	77.00
	0.05	0.6114	0.3883	77.31
	0.1	0.6117	0.3856	77.23

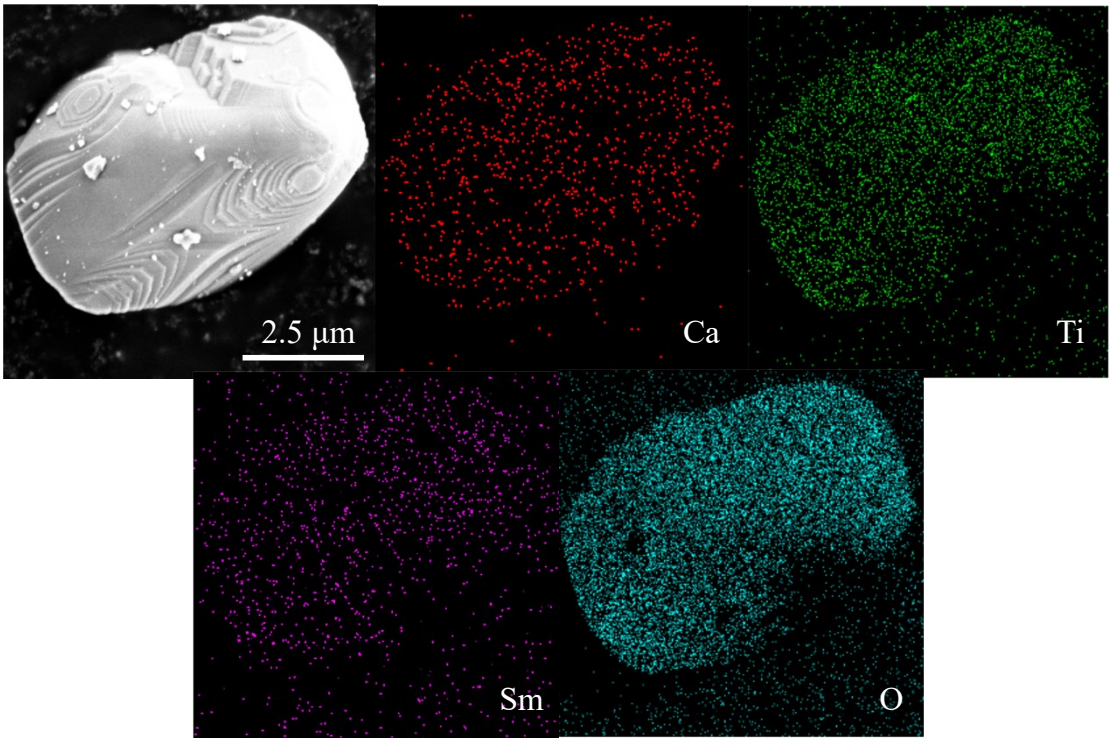

Figure S2. The SEM-EDS pattern of V_A-CST-0.1 and the element mapping for elements Ca, Ti, Sm and O. It can be seen that all the cations, especially the dopants Sm^{3+}, are uniformly distributed, confirming the successful incorporation.

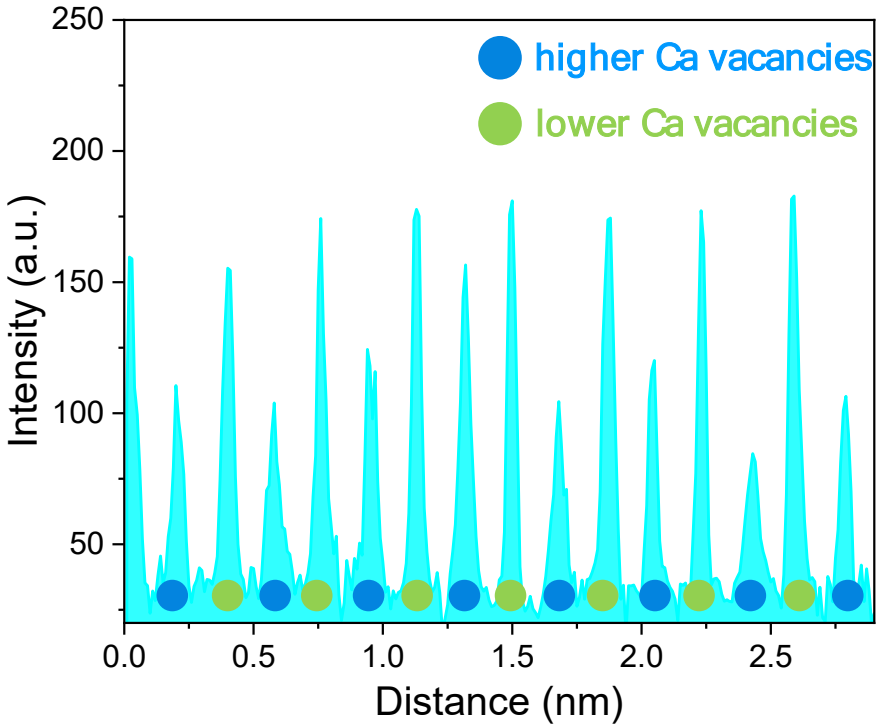

Figure S3. The intensity profiles of Ca vacancies in V_A-CST-0.02. It can be seen that the distribution of higher V_A and lower V_A is very obvious. This is well consistent with the ordered arrangements of superlattice-like structure.