Supplementary information:

Table S1. Mineral and synthetic compounds on which Ti-related blue luminescence (possibly BSL) has been described or inferred [1,27,29,39,79,83,88–101].

Mineral/compound	Emission (FWHM) nm	Lifetime decay	Proposed cause	Reference
$Ba_2TiP_2O_9$	490 (150)		TiO_6	[88]
$BaTiO_3$	490 (150)		TiO_6	[89]
$CaTiO_3$	450 (100)		TiOx x= 5,6	[90]
$KTiPO_5$	390			[83]
$LaNbTiO_6$	470 (50)		TiO_6	[91]
$Na_{0.5}Bi_{0.5}TiO_3$	445 (120)		TiO_6	[92]
Alkali feldspars $KAlSi_3O_8$	460		Ti^{4+}	[93]
Cassiterite SnO_2	440 (100)	0.05 μs	Ti or W	[29,79]
Catapleiite $Na_2Zr(Si_3O_9) \cdot 2H_2O$			Ti	[94]
Clinohumite $Mg_9(SiO_4)(OH)_2$	500 (120)		TiO_6	[29]
Diopside $CaMgSi_2O_6$	415 (200)			[39]
Hackmanite $Na_8(Al_6Si_6O_{24})Cl_2$	460		F-center- Ti^{3+} Ti^{4+}	[27]
Hectorite (Br, I)$Na_{0.3}(Mg_{2.7}Li_{0.3})Si_4O_{10}(OH)_2$	480		F-center- Ti^{3+}	[95]
Anatase TiO_2	480 (200)	--	Ti^{4+}	[1]
Ti:Ca_2SnO_4	445 (100)		TiO_6	[96]
Ti:$CaYAlO_4$	395 (120)		Ti^{4+}	[97]
Ti:$Li_4Ge_5O_{12}$	450		Ti^{4+}	[98]
Ti:Sr_2SnO_4	410 (150)		TiO_6	[96]
Ti:Y_2SiO_5	400		Ti^{4+}	[98]
Ti:Zn_2SiO_4	402			[99]
Ti:$ZnAl_2O_4$	490 (150)	1.2 μs	Ti^{4+}	[100]
Lorenzenite $Na_2Ti_2Si_2O_9$	520	0.4 μs		[29]
Titanite $CaTiSiO_5$	450 (100)			[29]
lithium potassium borate glass	478 (50)		Ti^{4+}	[101]
Phlogopite $KMg_3(AlSi_3O_{10})(OH)_2$	500 (150)	50 μs	TiO_6	[29]
Sorensenite $Na_4SnBe_2(Si_3O_9)_2 * 2H_2O$	500		TiO_6	[29]
Natisite $Na_2TiO[SiO_4]$	450 (150) and 510 (100)	--		[29]

Table S2. Data associated with figure 5, mineral & formula, Ti-O distance, emission maxima (in nm and eV), bibliographic sources for luminescence and Ti-O distance [1,9,16,29,40,77,89–92,102–119].

Mineral	Formula	Ti-O (A)	Emission maxima (nm)	Emission maxima (eV)	source luminescence	Ti-O distance source
Benitoite	$BaTiSi_3O_9$	1.949	420	2.87	[9]	[102]
Baratovite	$KLi_3Ca_7(Ti,Zr)_2(SiO_3)_{12}(OH,F)_2$	1.949	406	2.97	[16]	[103]
Katayamalite	$KLi_3Ca_7Ti_2(SiO_3)_{12}(OH,F)_2$	1.94	406	2.97	[16]	[104]
Lorenzite	$Na_2Ti_2O_3(Si_2O_6)$	1.99	470	2.56	[29]	[105]
Titanite	$CaTiSiO_5$	1.959	450	2.68	[29]	[106]
Penkvilksite	$Na_4Ti_2Si_8O_{22}\ 5H_2O$	1.957	440	2.74	[29]	[107]
Anatase	TiO_2	1.9797	480	2.51	[1]	[108]
corundum	Al_2O_3	1.95	415	2.90	[40]	[109]
	$CaTiO_3$	1.9547	462	2.61	[90]	[110]
Natisite	$Na_2Ti_3O_7$	1.99	450	2.68	[29]	[111]
	Li_2TiSiO_5	1.97	505	2.38	[89]	[112]
	Na_2TiSiO_5	1.99	490	2.46	[89]	[113]
	$Na_2TiOGeO_4$	2	425	2.83	[89]	[89]
	$NbPO_5$	1.97	490	2.46	[89]	[114]
	$LiTiPO_5$	2.02	520	2.32	[89]	[115]
	$BaTiO_3$	2	490	2.46	[89]	[116]
	$KTiPO_5$	1.99	420	2.87	[89]	[117]
	$LaNbTiO_6$	1.98916667	470	2.56	[91]	[118]
	$Na_{0.5}Bi_{0.5}TiO_3$	1.959	445	2.71	[92]	[119]
	$Ca_{14}Al_{10}Zn_6O_{35}$	1.936	354	3.40	[77]	[77]
	$Ca_{14}Al_{10}Zn_6O_{35}$	1.936	384	3.14	[77]	[77]