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(54) Title: CARBONITRIDE BASED PHOSPHORS AND LIGHT EMITTING DEVICES USING THE SAME

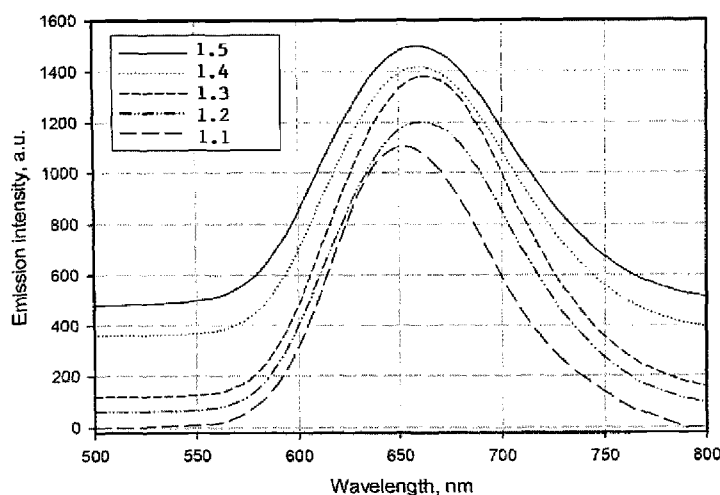


Figure 1

(57) Abstract: Disclosed herein is a novel group of carbonitride phosphors and light emitting devices which utilize these phosphors. In certain embodiments, the present invention is directed to a novel family of carbonitride-based phosphors expressed as follows: (1) $\text{Ca}_{1-x}\text{Al}_x\text{Si}_{1-y-z}\text{N}_{2-x-y-z}\text{C}_y\text{A}$; (2) $\text{Ca}_{1-x-z}\text{Na}_z\text{M(III)}_{x-xy-z}\text{Si}_{1-x+y+z}\text{N}_{2-y-z}\text{C}_y\text{A}$; (3) $\text{M(II)}_{1-x-z}\text{M(I)}_z\text{M(III)}_{x-xy-z}\text{Si}_{1-x+y+z}\text{N}_{2-x-y-z}\text{C}_y\text{A}$; (4) $\text{M(II)}_{1-x-z}\text{M(I)}_z\text{M(III)}_{x-xy-z}\text{Si}_{1-x+y+z}\text{N}_{2-x-y-2w/3}\text{C}_y\text{O}_{w-v/2}\text{H}_v\text{A}$; and (4a) $\text{M(II)}_{1-x-z}\text{M(I)}_z\text{M(III)}_{x-xy-z}\text{Si}_{1-x+y+z}\text{N}_{2-x-y-2w/3-v/3}\text{C}_y\text{O}_{w-v/2}\text{H}_v\text{A}$, wherein $0 < x < 1$, $0 < y < 1$, $0 < z < 1$, $0 < v < 1$, $0 < w < 1$, $x > xy + z$, and $0 < x - xy - z < 1$, M(II) is at least one divalent cation, M(I) is at least one monovalent cation, M(III) is at least one trivalent cation, H is at least one monovalent anion, and A is a luminescence activator doped in the crystal structure.