

Solid State Lighting

High Performance Phosphors



Light up your business with **ISIPHOR™**
from **Litec-LLL**



Silicate Phosphors - Vivid BOSE

Designed for your needs

The Isiphor™ Phosphors from Litec-LLL GmbH add value to your applications from any perspective:

Isiphor™ is ideal for LED applications with Color on Demand and warm white light concepts, We offer the best quality and the highest efficiency for general lighting and backlighting applications. Our unique and IP-protected coating technology form best in class reliability of Silicate phosphors.

We are your one stop shop offering fully customizable solutions.

Characteristics:

- Stabilized ortho-silicate
- Good brightness
- Broad range of green, yellow and orange phosphors

Applications:

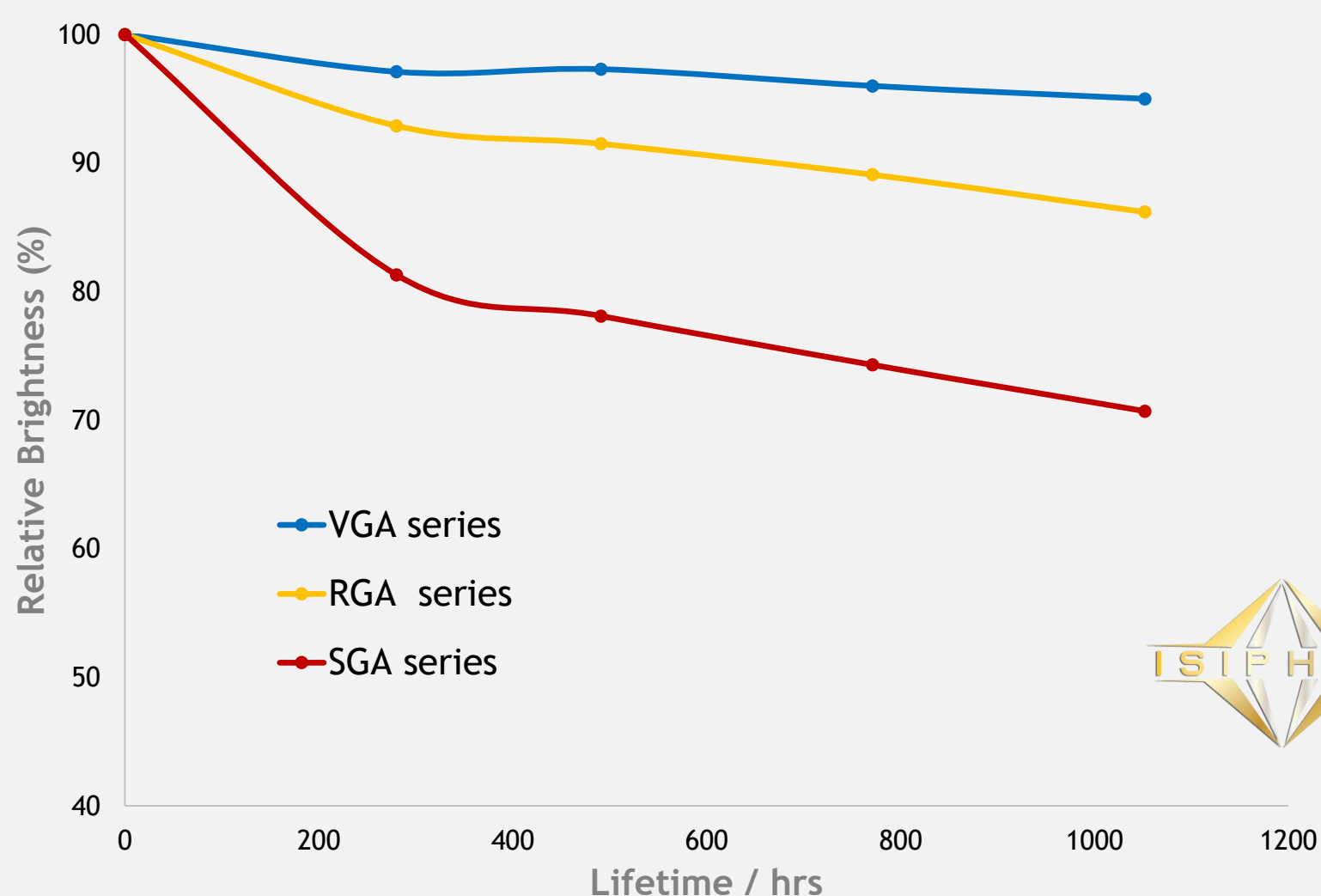
- Low-power and medium-power LEDs
- Ideal for mixture with red phosphor for warm white application
- BLU: Mobile devices, Tablets and Monitor
- General lighting: Moderate CRI
- Automotive interior lighting

Lifetime Reliability behavior of Silicate Phosphors:

VGA Vivid BOSE

RGA Reliable BOSE

SGA Standard BOSE



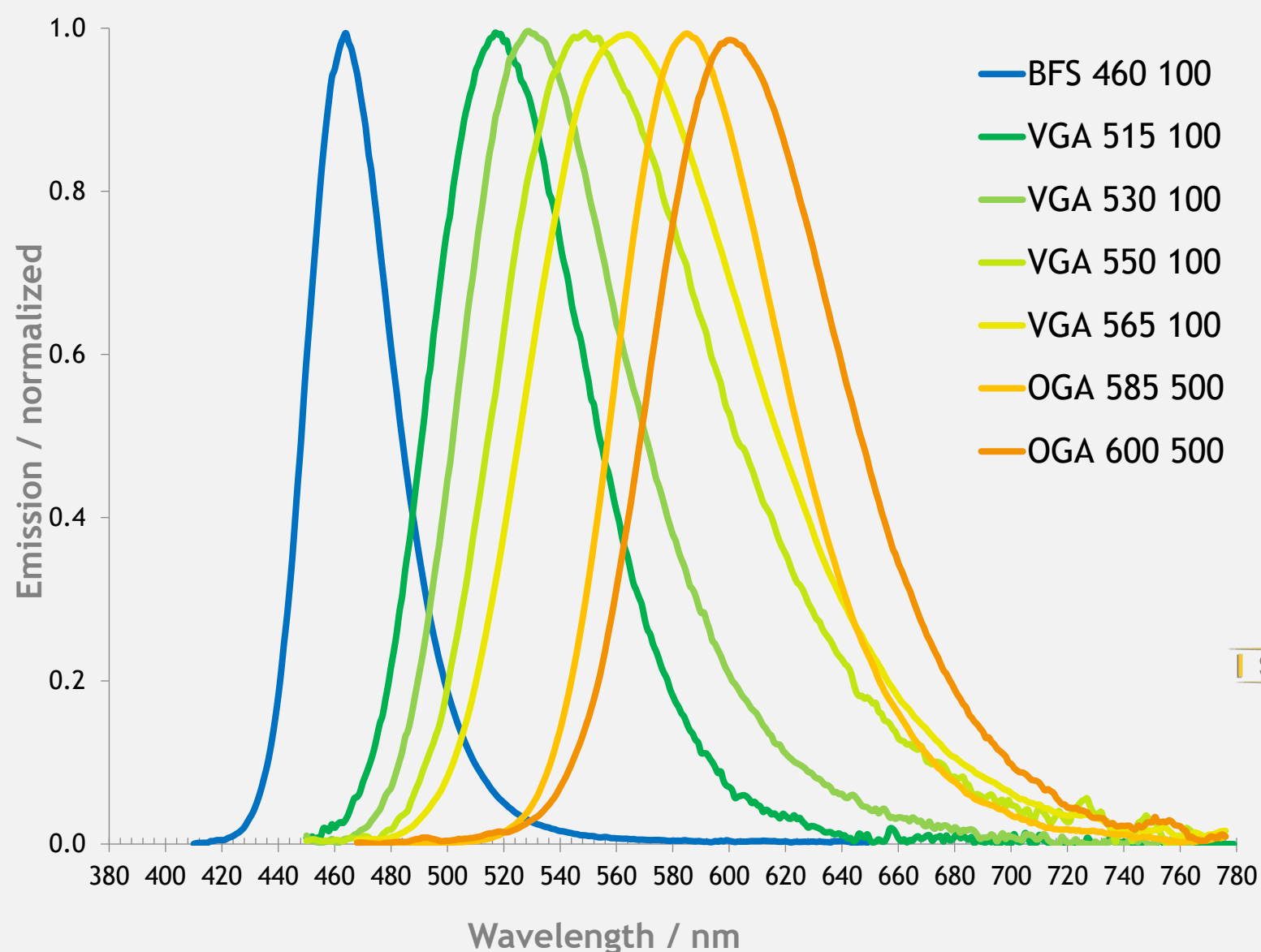
*Measured in 1W COB LED at 350 mA and 85 °C / 85% rel. humidity; blue wavelength excited @ 443 nm

Product	Emission Color	Peak Wavelength / nm	CIE x 1931	CIE y 1931	Particle Size Distribution*		
					D10/ μm	D50/ μm	D90/ μm
BFS 460 100**	light green	460	0,134	0,080	9,5 \pm 1,0	16,0 \pm 1,0	24,5 \pm 1,0
BFS 466 100**	light green	466	0,130	0,107	8,5 \pm 1,0	14,5 \pm 1,0	22,0 \pm 1,0
VGA 515 100	green	515	0,223	0,629	12 \pm 1,0	19 \pm 1,0	27 \pm 1,0
VGA 516 100	green	516	0,225	0,623	7,5 \pm 1,0	17,5 \pm 1,0	30,5 \pm 1,0
VGA 521 100	green	522	0,263	0,641	10,5 \pm 1,0	17,0 \pm 1,0	25,5 \pm 1,0
VGA 524 100	green	526	0,282	0,635	7,0 \pm 1,0	13,0 \pm 1,0	20,5 \pm 1,0
VGA 527 100	green	527	0,297	0,628	9,0 \pm 1,0	17,0 \pm 1,0	26,5 \pm 1,0
VGA 530 100	green	530	0,307	0,626	10,5 \pm 1,0	17,5 \pm 1,0	25,5 \pm 1,0
VGA 535 100	green	535	0,340	0,609	10 \pm 1,0	16 \pm 1,0	22,5 \pm 1,0
VGA 540 100	green	538	0,365	0,596	7,5 \pm 1,0	12,5 \pm 1,0	18 \pm 1,0
VGA 550 100	green	550	0,403	0,570	7 \pm 1,0	12 \pm 1,0	18 \pm 1,0
VGA 565 100	yellow	564	0,450	0,537	9 \pm 1,0	14,5 \pm 1,0	21,5 \pm 1,0
OGA 585 500	orange	587	0,543	0,455	7,0 \pm 1,0	14,0 \pm 1,0	23,0 \pm 1,0
OGA 595 500	orange	595	0,567	0,432	5,0 \pm 1,0	11,0 \pm 1,0	20,5 \pm 1,0
OGA 600 500	orange	602	0,585	0,413	5,5 \pm 1,0	11,0 \pm 1,0	20,0 \pm 1,0

* Coulter Counter, volume-based statistics

** Excitation 400 nm for purple chip

Emission Spectra of silicate phosphors - Vivid BOSE



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Silicate Phosphors - Reliable BOSE

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Characteristics:

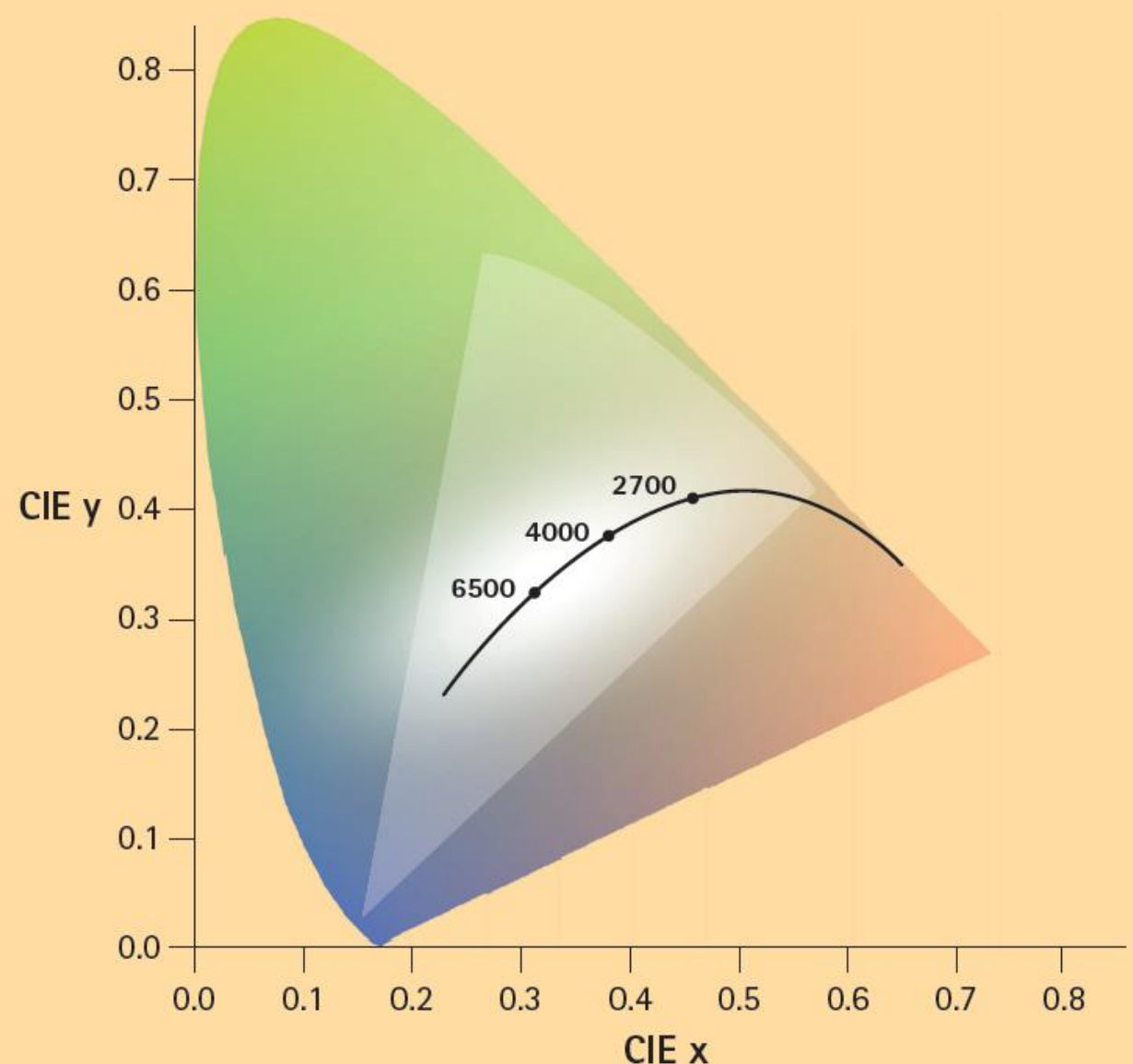
- Stabilized ortho-silicate
- Good brightness
- Broad range of green, yellow and orange phosphors

Applications:

- Low-power and medium-power LEDs
- Ideal for mixture with red phosphor for warm white application
- BLU: Mobile devices, Tablets and Monitor
- General lighting: Moderate CRI
- Automotive interior lighting

Color Space:

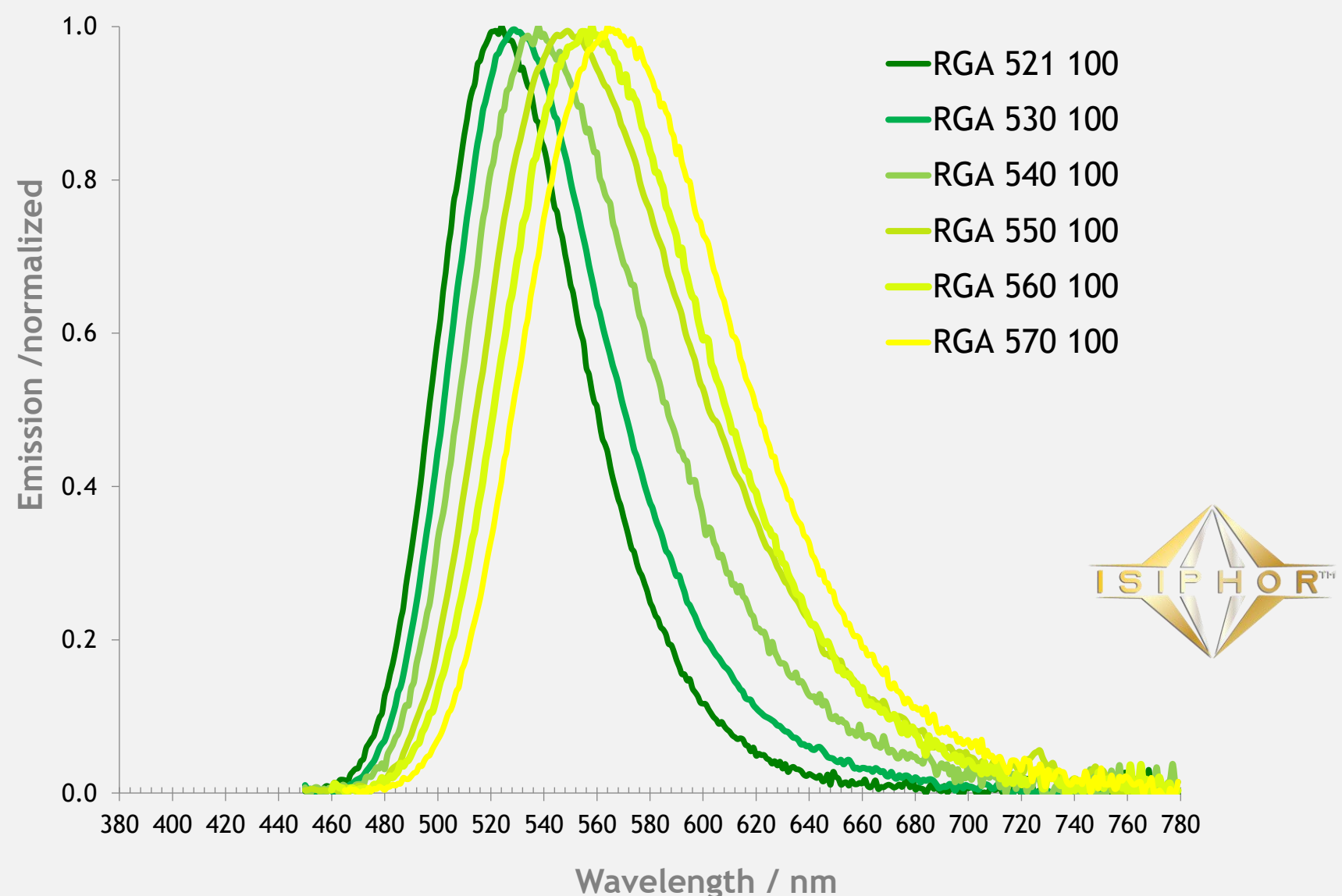
Color variation of
Silicate Phosphors –
stable BOSE



Product	Emission Color	Peak Wavelength / nm	CIE x 1931	CIE y 1931	Particle Size Distribution*		
					D10/ μm	D50/ μm	D90/ μm
RGA 521 100	green	522	0,262	0,639	8 \pm 1,0	16 \pm 1,0	25,5 \pm 1,0
RGA 524 100	green	524	0,286	0,633	8 \pm 1,0	15 \pm 1,0	23,5 \pm 1,0
RGA 526 100	green	526	0,297	0,629	8 \pm 1,0	15 \pm 1,0	22,0 \pm 1,0
RGA 530 100	green	530	0,303	0,628	11 \pm 1,0	18 \pm 1,0	25,5 \pm 1,0
RGA 533 100	green	533	0,318	0,619	9 \pm 1,0	17,5 \pm 1,0	25,5 \pm 1,0
RGA 535 100	green	534	0,338	0,610	8 \pm 1,0	14,5 \pm 1,0	21 \pm 1,0
RGA 540 100	green	539	0,362	0,596	6,5 \pm 1,0	11,5 \pm 1,0	17 \pm 1,0
RGA 545 100	green	542	0,373	0,587	6,5 \pm 1,0	12,5 \pm 1,0	19 \pm 1,0
RGA 550 100	yellow	550	0,398	0,574	10 \pm 1,0	17,5 \pm 1,0	26,5 \pm 1,0
RGA 555 100	yellow	553	0,418	0,562	9 \pm 1,0	16 \pm 1,0	24 \pm 1,0
RGA 560 100	yellow	558	0,432	0,551	8,5 \pm 1,0	15,5 \pm 1,0	23 \pm 1,0
RGA 562 100	yellow	561	0,440	0,545	8 \pm 1,0	14 \pm 1,0	22 \pm 1,0
RGA 564 100	yellow	562	0,446	0,539	8 \pm 1,0	15 \pm 1,0	24 \pm 1,0
RGA 565 100	yellow	564	0,449	0,537	8 \pm 1,0	16,5 \pm 1,0	24 \pm 1,0
RGA 569 100	yellow	569	0,459	0,529	8,5 \pm 1,0	13,5 \pm 1,0	20 \pm 1,0
RGA 570 100	yellow	568	0,462	0,526	7,5 \pm 1,0	13,5 \pm 1,0	21 \pm 1,0

* Coulter Counter, volume-based statistics

Emission Spectra of selected Silicate Phosphors -Reliable BOSE



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Silicate Phosphors - BOSE

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Characteristics:

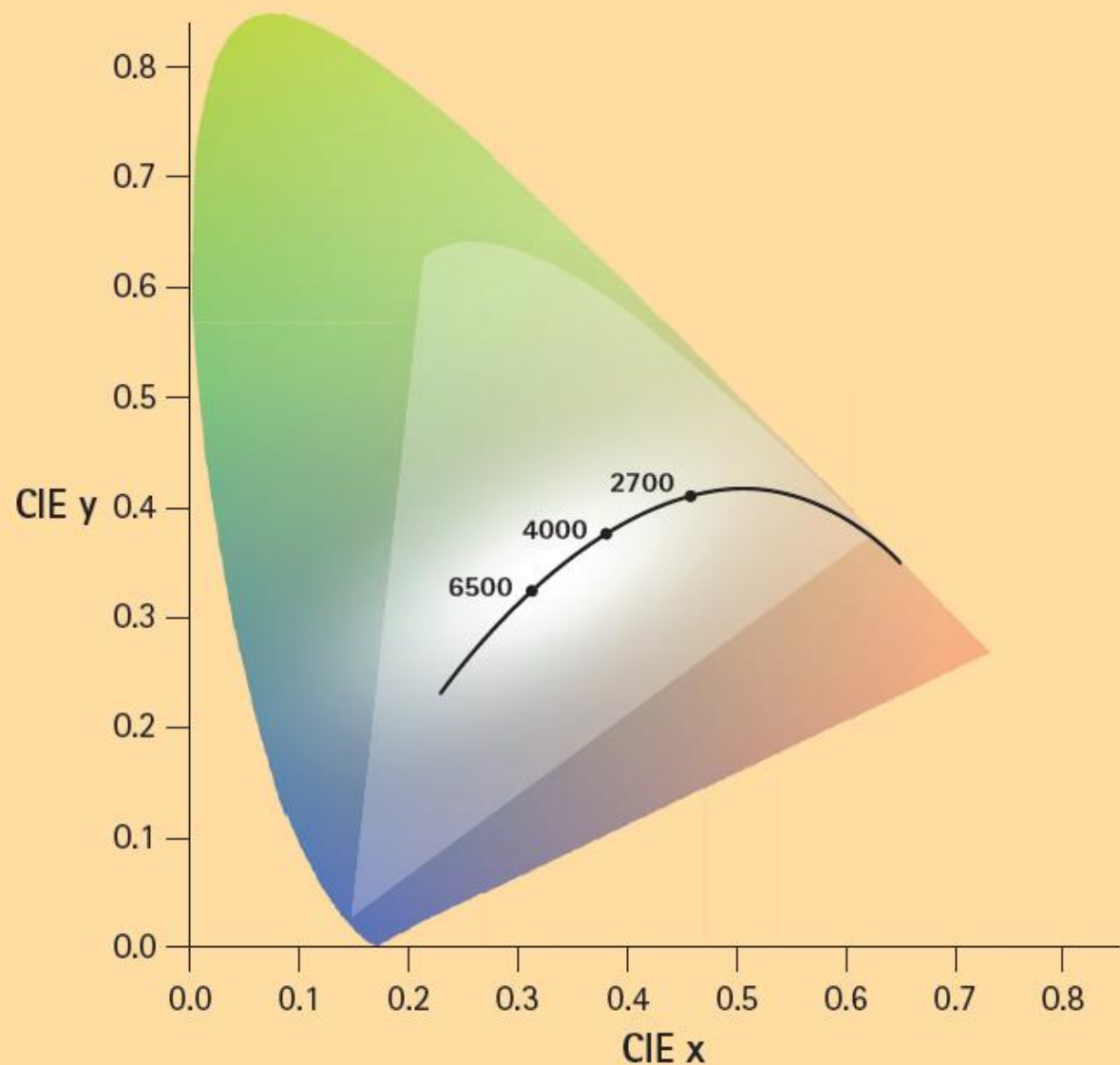
- Ortho-Silicate
- Good Brightness
- Broad range of green, yellow and orange phosphors
- orange phosphors

Applications:

- low- to mid-Power LEDs
- Backlighting
- General Lighting
- Color on Demand

Color Space:

Color variation of
Silicate Phosphors -
BOSE

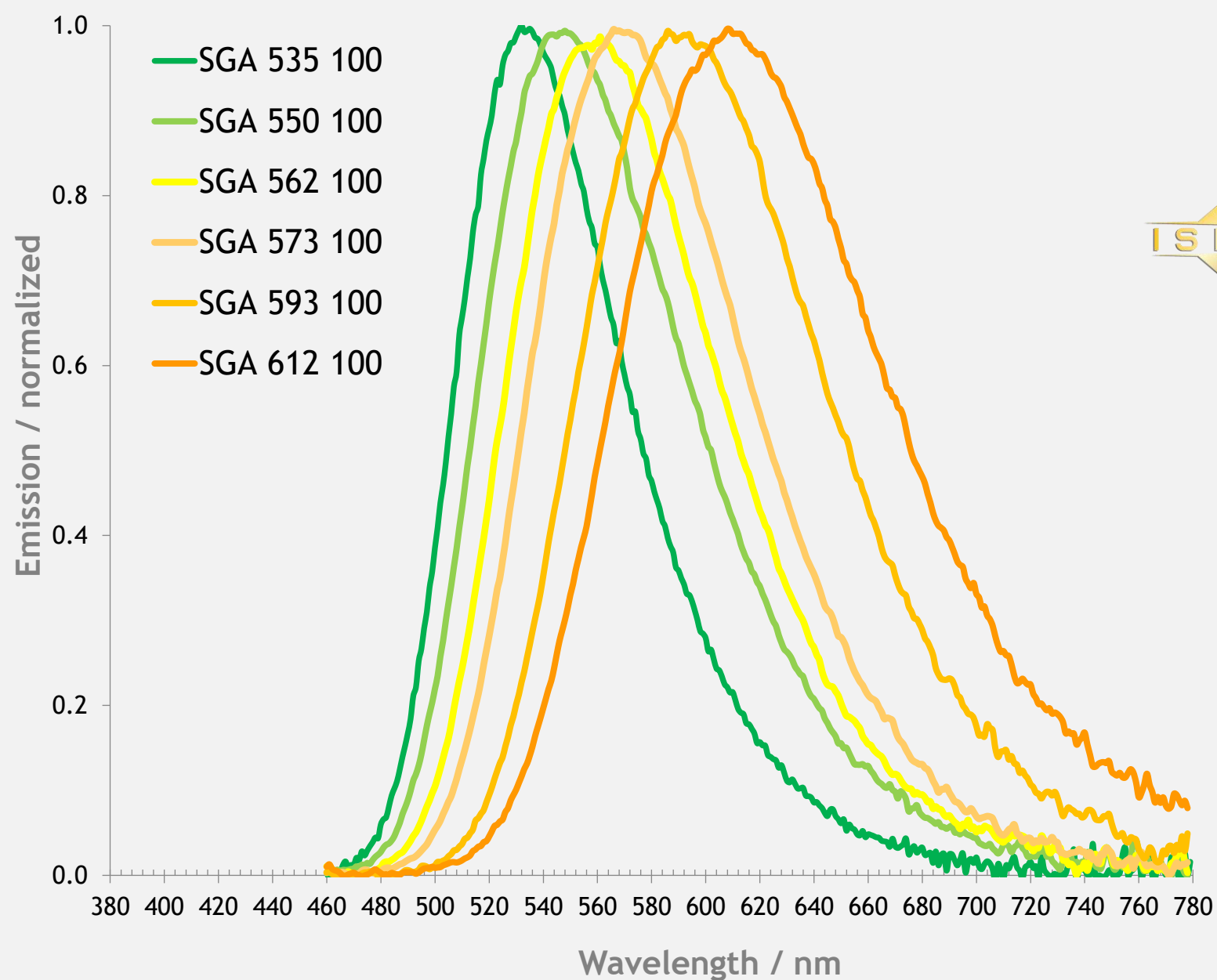


Product	Emission Color	Peak Wavelength / nm	CIE x 1931	CIE y 1931	Particle Size Distribution*		
					D10/ μm	D50/ μm	D90/ μm
SGA 535 100	green	533	0,338	0,612	8,0 \pm 1,0	13,5 \pm 1,0	19,0 \pm 1,0
SGA 540 100	green	544	0,377	0,587	6,5 \pm 1,0	12,0 \pm 1,0	18,5 \pm 1,0
SGA 550 100	yellow	547	0,401	0,571	6,0 \pm 1,0	10,0 \pm 1,0	15,0 \pm 1,0
SGA 555 100	yellow	555	0,419	0,559	8,0 \pm 1,0	13,0 \pm 1,0	19,0 \pm 1,0
SGA 555 120	yellow	552	0,417	0,563	8,5 \pm 1,0	16,5 \pm 1,0	26,5 \pm 1,0
SGA 560 100	yellow	560	0,432	0,550	8,0 \pm 1,0	13,5 \pm 1,0	20,0 \pm 1,0
SGA 562 100	yellow	562	0,442	0,543	8,0 \pm 1,0	14,0 \pm 1,0	21,0 \pm 1,0
SGA 562 110	yellow	562	0,440	0,544	6,0 \pm 1,0	10,0 \pm 1,0	15,0 \pm 1,0
SGA 565 100	yellow	565	0,450	0,536	6,5 \pm 1,0	11,5 \pm 1,0	18,0 \pm 1,0
SGA 565 300	yellow	564	0,449	0,538	7,5 \pm 1,0	13,0 \pm 1,0	19,5 \pm 1,0
SGA 567 100	yellow	566	0,453	0,535	8,0 \pm 0,5	13,5 \pm 0,5	21,0 \pm 0,5
SGA 572 100	yellow	571	0,471	0,519	9,0 \pm 1,0	17,0 \pm 1,0	24,5 \pm 1,0
SGA 573 100	yellow	572	0,474	0,518	8,0 \pm 1,0	15,0 \pm 1,0	22,5 \pm 1,0
SGA 593 100	orange	592	0,535	0,461	8,5 \pm 1,0	15,5 \pm 1,0	23,5 \pm 1,0
SGA 612 100	orange	612	0,571	0,426	8,0 \pm 1,0	13,5 \pm 1,0	19,5 \pm 1,0

* Coulter Counter, volume-based statistics

Emission Spectra Selected Silicate Phosphors *standard* BOSE

Our SGA are also available in VGA version



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Lutetium Based Garnet Phosphors

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Characteristics:

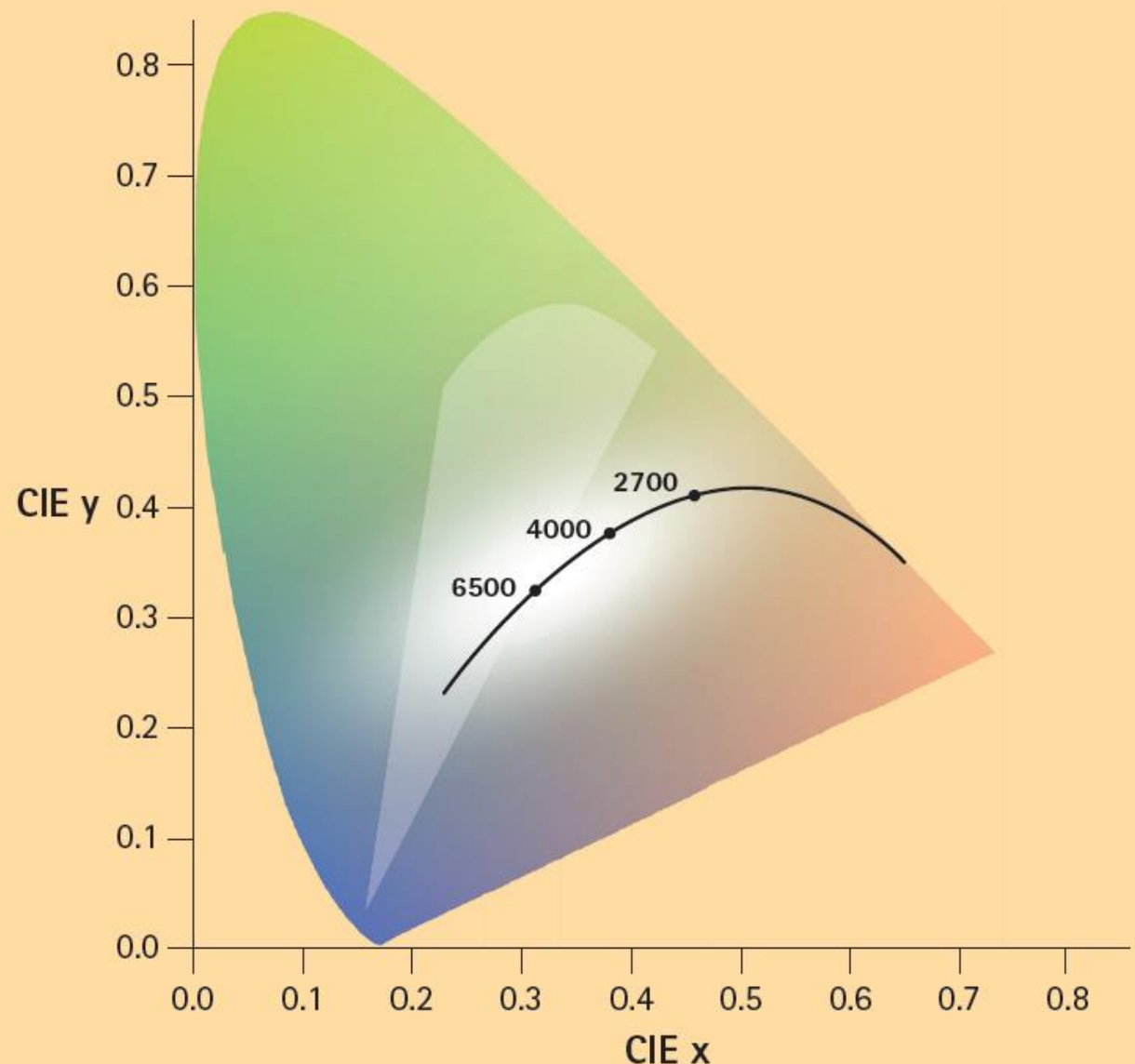
- Garnet phosphors
- Very good reliability
- Variable particle size
- Homogenous morphology
- Best in class quantum efficiency
- Cyan Garnet available

Applications:

- High-power LEDs for general lighting
- Warm white with high CRI
- Automotive Lighting

Color Space:

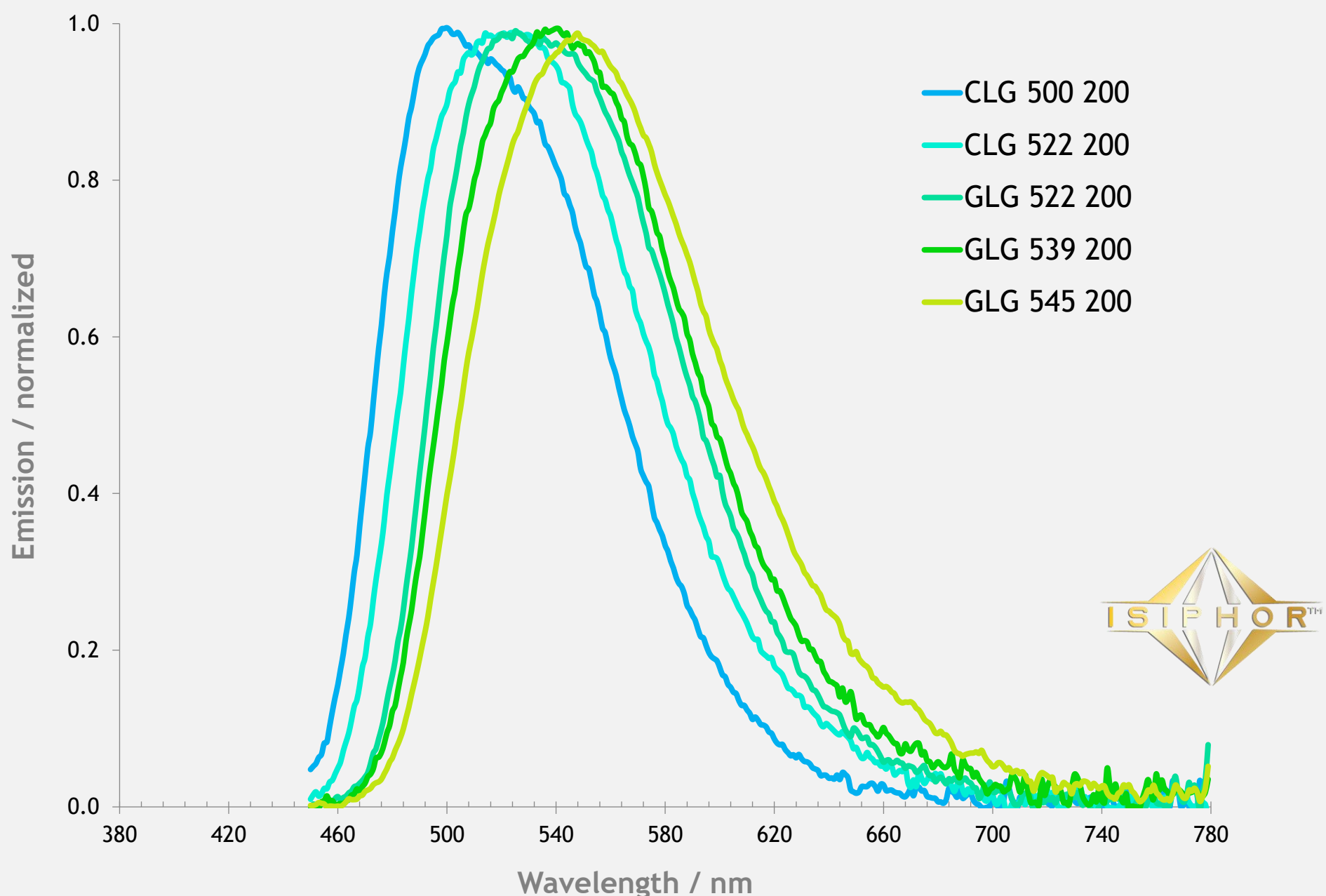
Color variation of
Lutetium based
Garnet Phosphors



Product	Emission Color	Peak Wavelength / nm	CIE x 1931	CIE y 1931	Particle Size Distribution*		
					D10/ μm	D50/ μm	D90/ μm
CLG 500 200	green	500	0,243	0,521	9,0 \pm 1,0	13,5 \pm 1,0	18,0 \pm 1,0
CLG 510 200	green	510	0,279	0,559	10,0 \pm 1,0	14,5 \pm 1,0	19,0 \pm 1,0
CLG 522 200	green	522	0,299	0,561	7,5 \pm 1,0	13,0 \pm 1,0	18,0 \pm 1,0
GLG 518 200	green	519	0,340	0,582	6 \pm 2,0	13,0 \pm 2,0	24,0 \pm 2,0
GLG 520 200	green	523	0,338	0,579	9,6 \pm 3,0	16,8 \pm 3,0	26,5 \pm 3,0
GLG 522 200	green	520	0,342	0,582	9,0 \pm 1,0	14,5 \pm 1,0	21,5 \pm 1,0
GLG 529 200	green	536	0,347	0,583	13,0 \pm 1,0	19,0 \pm 1,0	25,0 \pm 1,0
GLG 537 220	green	535	0,354	0,582	14,5 \pm 1,0	22,0 \pm 1,0	29,0 \pm 1,0
GLG 538 200	green	538	0,353	0,581	11,5 \pm 1,0	16,5 \pm 1,0	23,5 \pm 1,0
GLG 539 200	green	539	0,362	0,579	10,0 \pm 1,0	15,0 \pm 1,0	20,0 \pm 1,0
GLG 542 210	green	544	0,375	0,572	10,0 \pm 1,0	14,0 \pm 1,0	18,0 \pm 1,0
GLG 543 200	green	541	0,378	0,571	10,0 \pm 1,0	16,0 \pm 1,0	23,5 \pm 1,0
GLG 545 200	green	548	0,394	0,563	11,0 \pm 1,0	17,5 \pm 1,0	27,0 \pm 1,0

* Coulter Counter, volume-based statistics

Emission Spectra of selected Lutetium based Garnet Phosphors



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Yttrium Based Garnet Phosphors

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Characteristics:

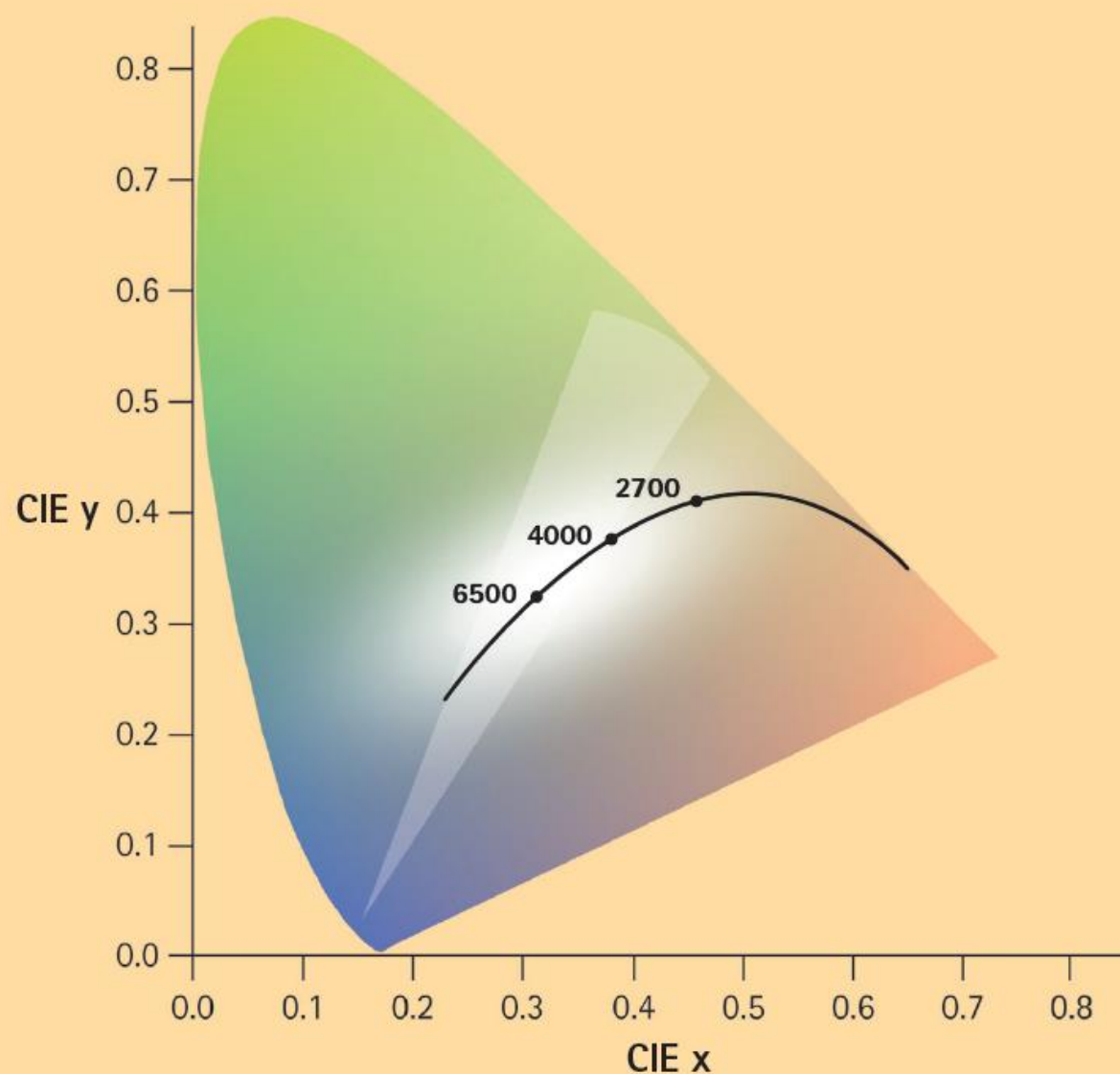
- Garnet phosphors
- Highest reliability
- Low thermal quenching
- High brightness
- Homogenous morphology
- Best in class quantum efficiency
- Green and orange YAG available

Applications:

- High-power LEDs for general lighting
- Backlighting: Mobile device, tablet PCs
- Cool to neutral white applications

Color Space:

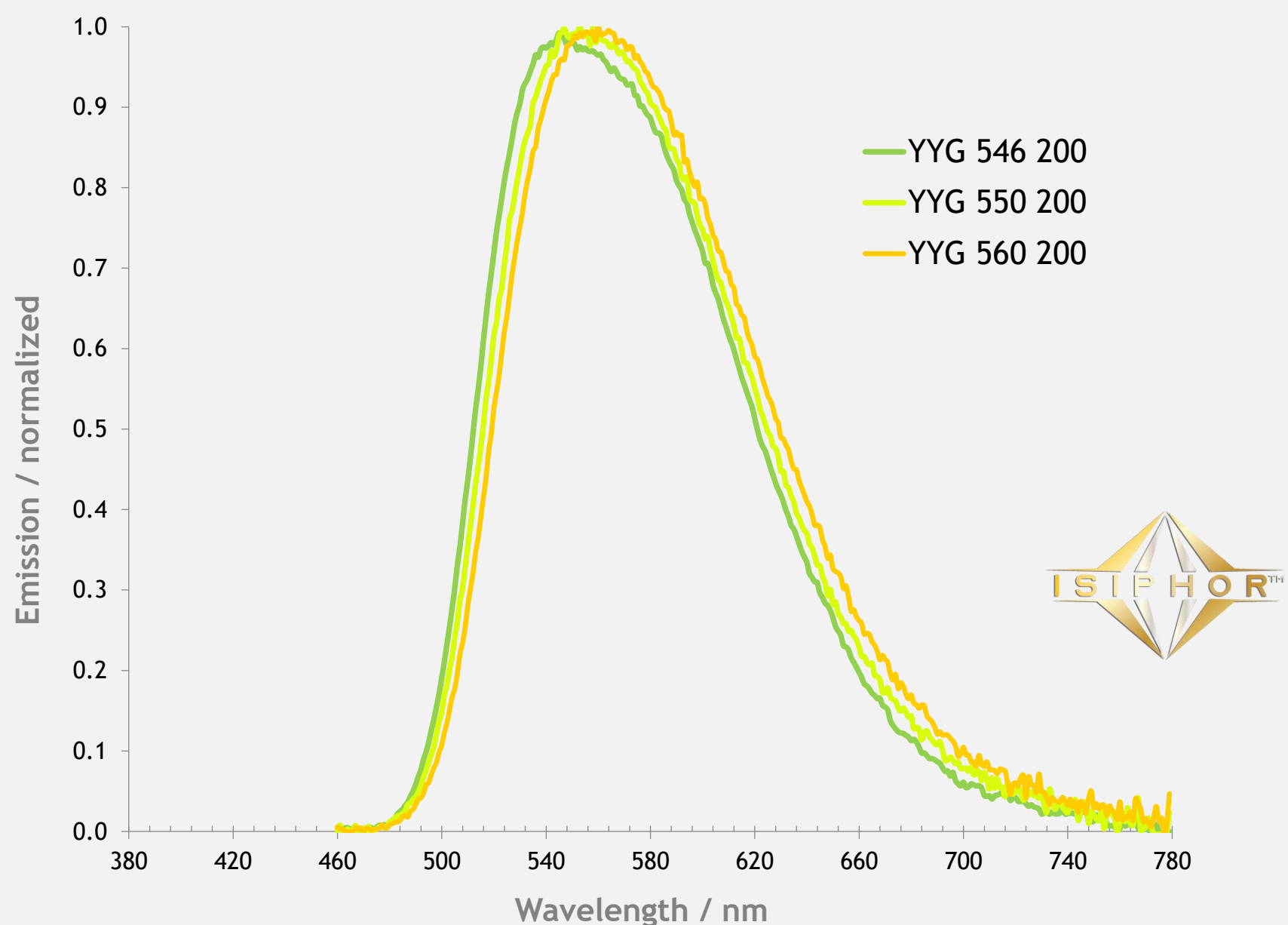
Color variation of Yttrium based Garnet Phosphors



Product	Emission Color	Peak Wavelength / nm	CIE x 1931	CIE y 1931	Particle Size Distribution*		
					D10/ μm	D50/ μm	D90/ μm
YYG 545 200	yellow	548	0,429	0,549	8,5 \pm 1,0	15,0 \pm 1,0	20,0 \pm 1,0
YYG 546 200	yellow	547	0,428	0,550	13,0 \pm 1,0	20,0 \pm 1,0	27,0 \pm 1,0
YYG 555 200	yellow	555	0,443	0,540	11,0 \pm 1,0	16,0 \pm 1,0	22,0 \pm 1,0
YYG 560 200	yellow	561	0,455	0,531	13,0 \pm 1,0	20,5 \pm 1,0	25,5 \pm 1,0

* Coulter Counter, volume-based statistics

Emission Spectra of selected Yttrium based Garnet Phosphors



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