

RESEARCH ON MEASUREMENT METHODS FOR ORGANIC LIGHT-EMITTING DIODES

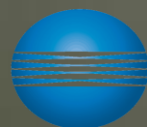
TOKI KAWABATA

KONICA MINOLTA HOLDINGS, INC.

JAPAN

National Institute of Standards and Technologies

USA



KONICA MINOLTA

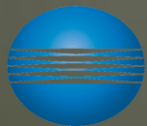
NIST

National Institute of Standards and Technology
Technology Administration, U.S. Department of Commerce

Who is Toki?



- *Belong to KONICA MINOLTA HOLDINGS, INC*
- *Developed color and light measuring instruments since 1987*
- *Guest researcher in NIST since Jan. 2012*
- *Interested in the practical methods for OLED lighting*
- * An active member of IESNA*



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AGENDA

- 1. OLED Samples*
- 2. Test result with 1m sphere*
- 3. Test result about angular shift*
- 4. Issues about OLED measurement*

1. OLED Samples

7 samples from 6 manufactures

Kaneka

KONICA MINOLTA

*Lumiotec * 2 items with different CT*

OSRAM

Panasonic Idemitsu

Philips

2. Test result with 1m sphere

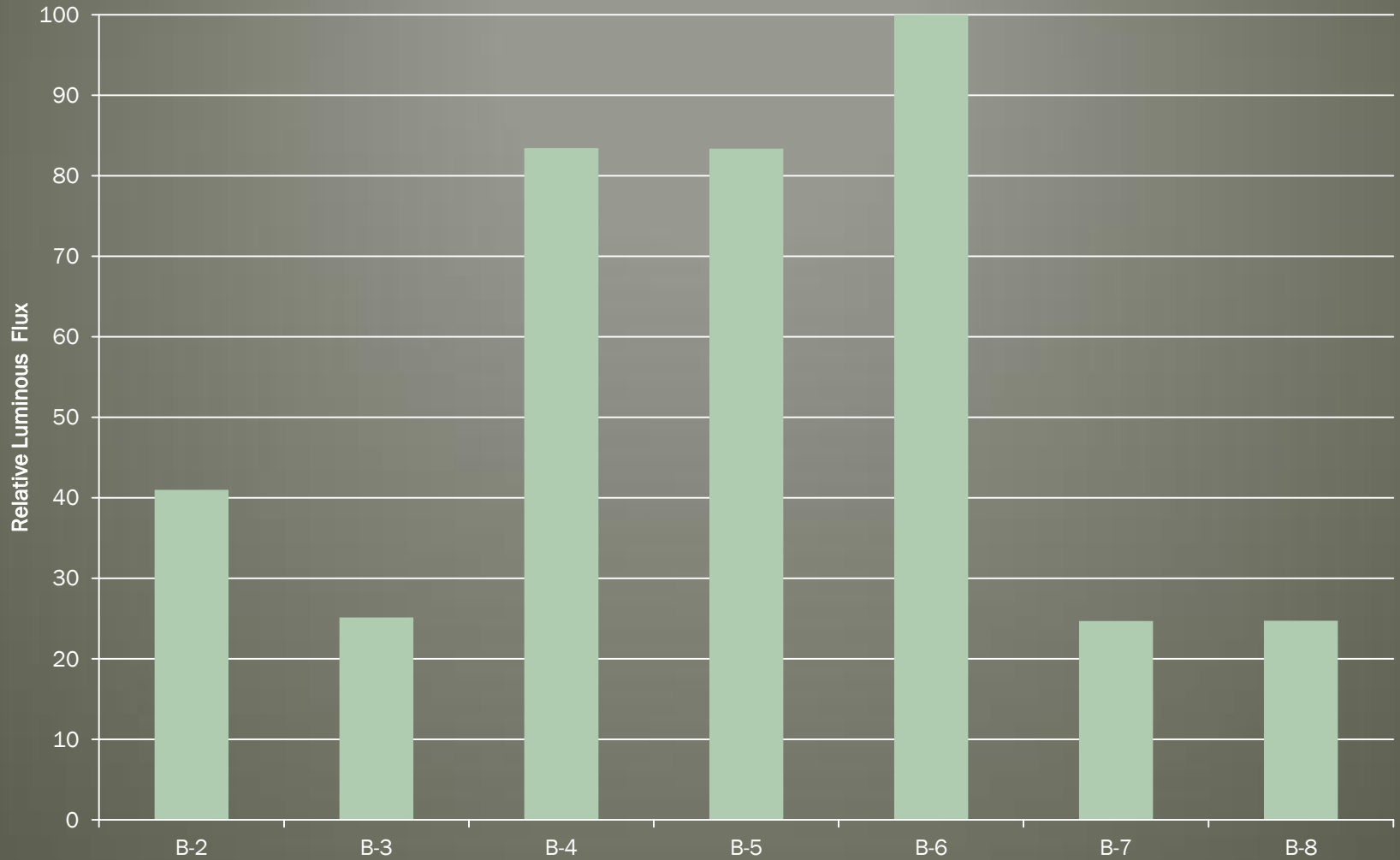
2-a. System for measurement

1m sphere with temperature controlled (SPR-600)
Irradiance spectro-radiometer (CS-2000A)
Power supply (E3617A)
IR thermometer (DT-8380)



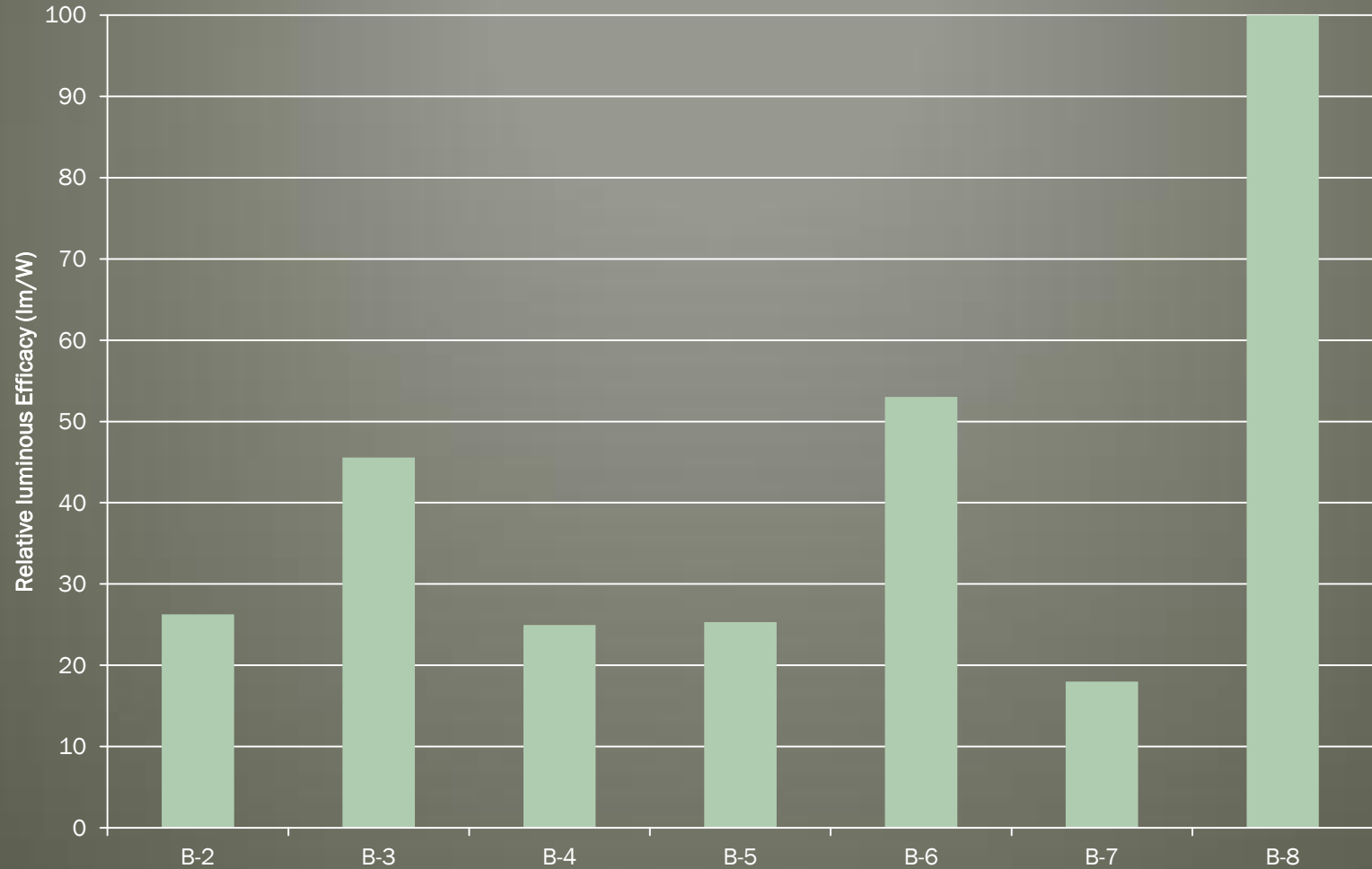
2-b-1 Relative Luminous Flux

Luminous Flux



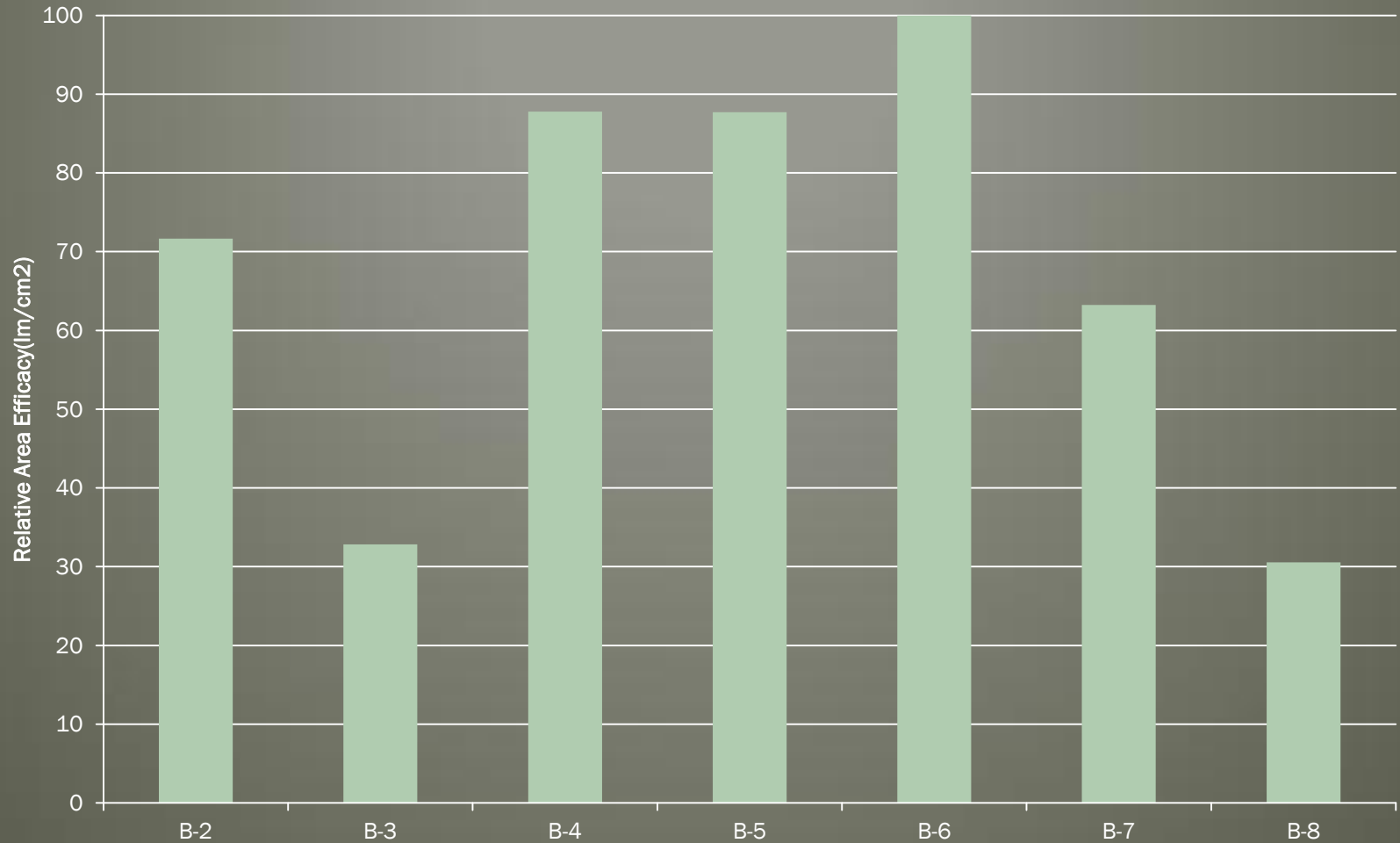
2-b-2 Relative luminous Efficacy (lm/W)

Relative luminous Efficacy (lm/W)

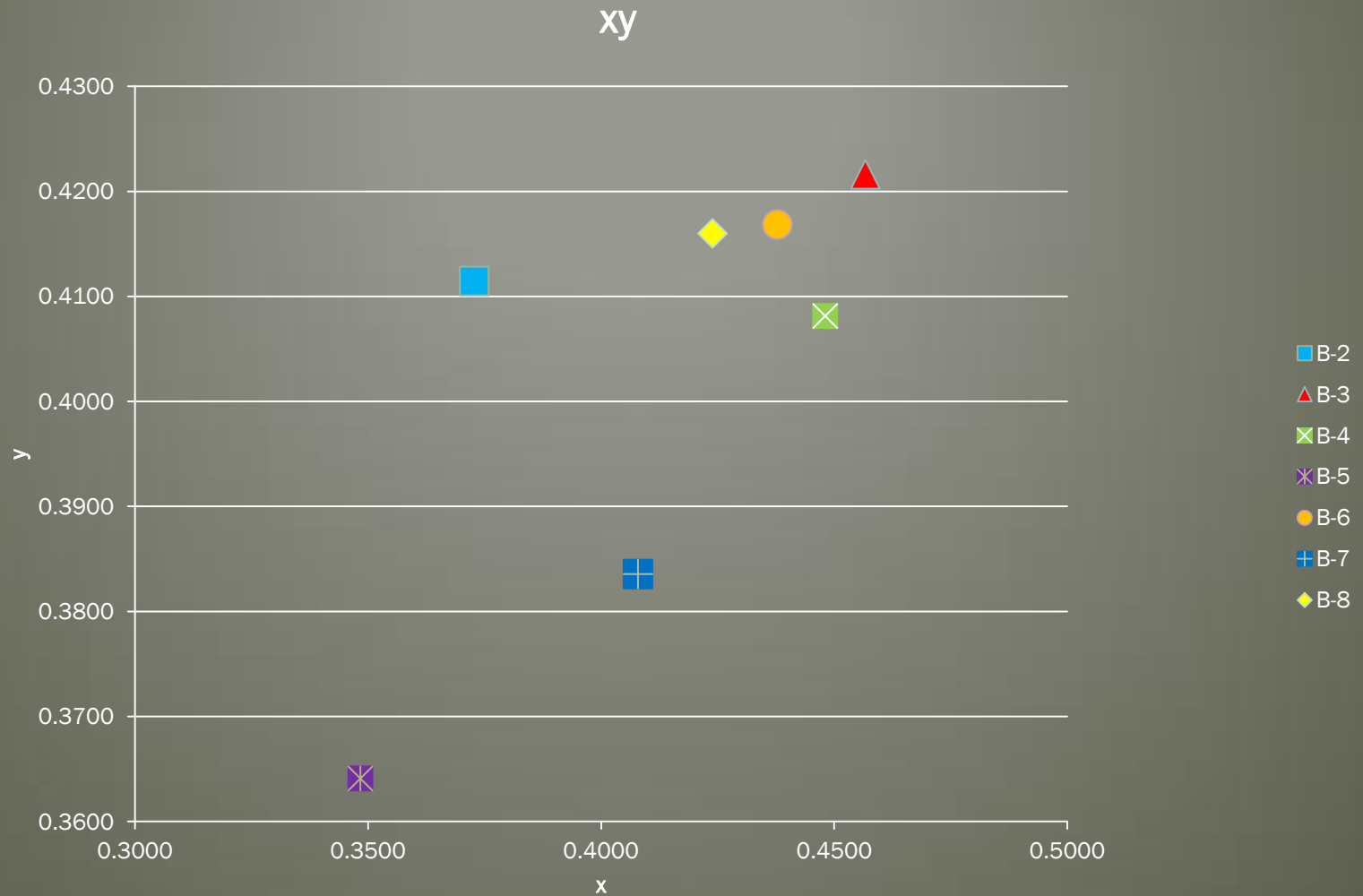


2-b-3 *Relative Area Efficacy(lm/cm2)*

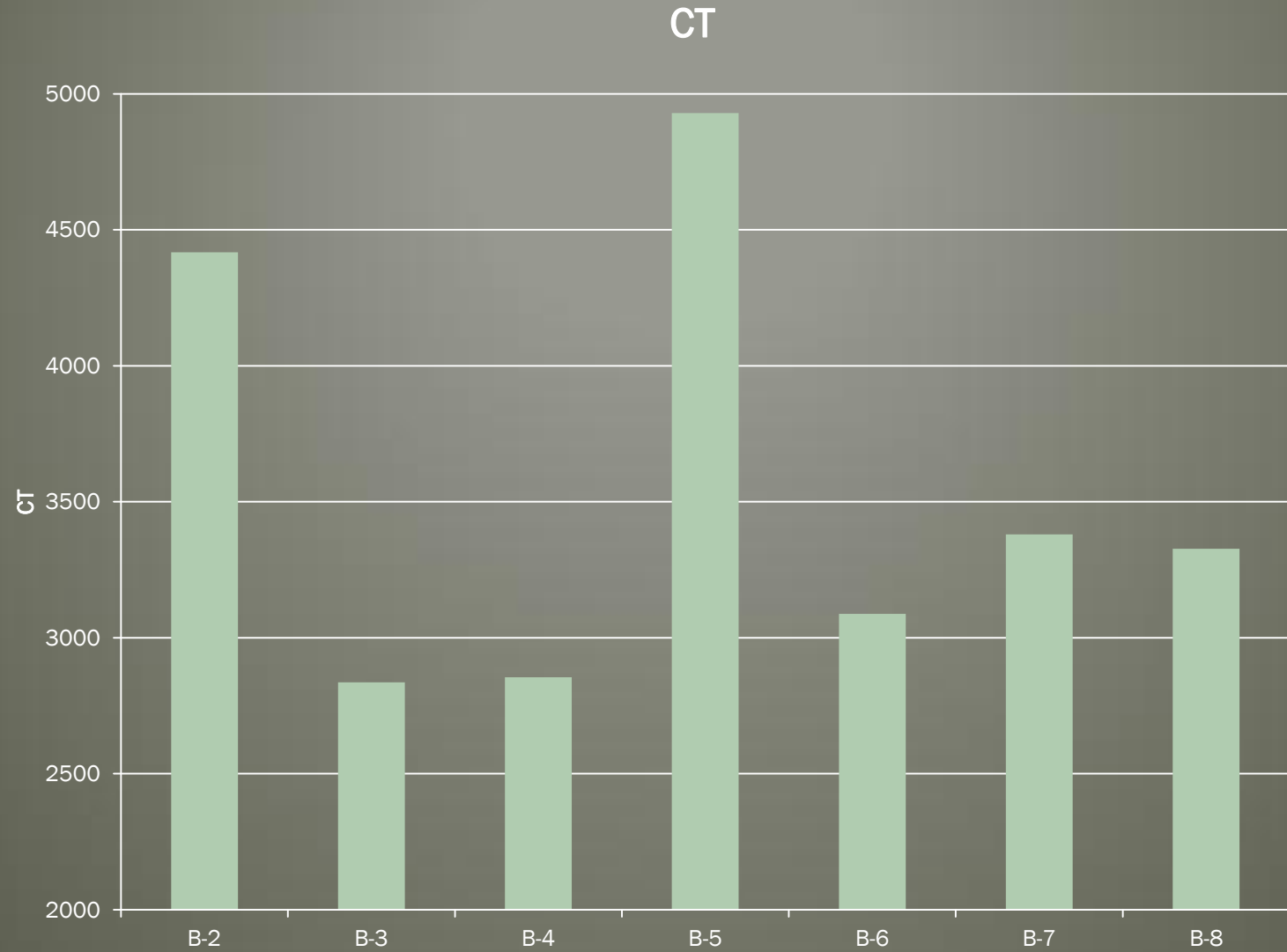
Relative Area Efficacy(lm/cm2)



2-b-4 color coordinate x, y

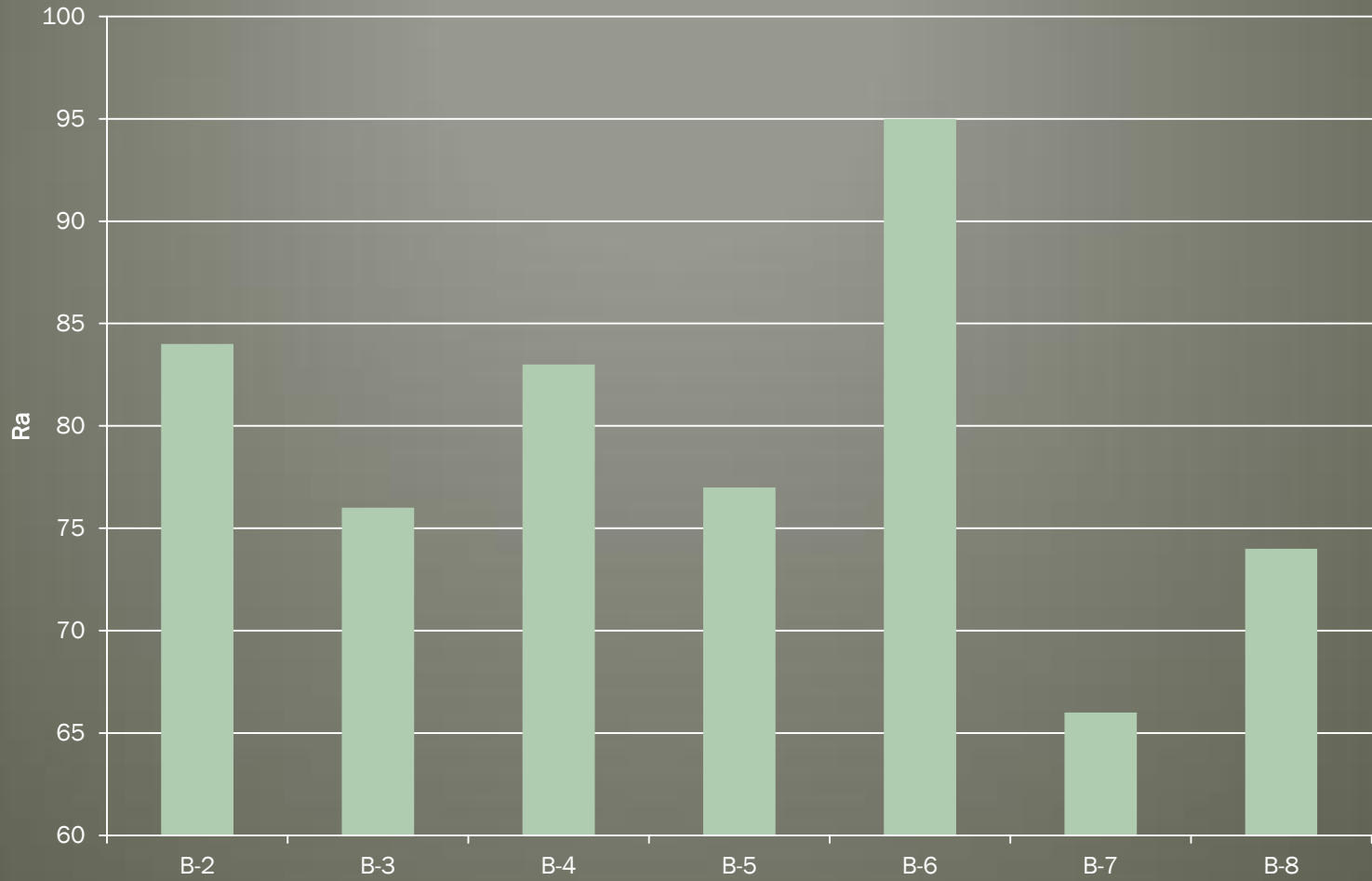


2-b-5 color temperature

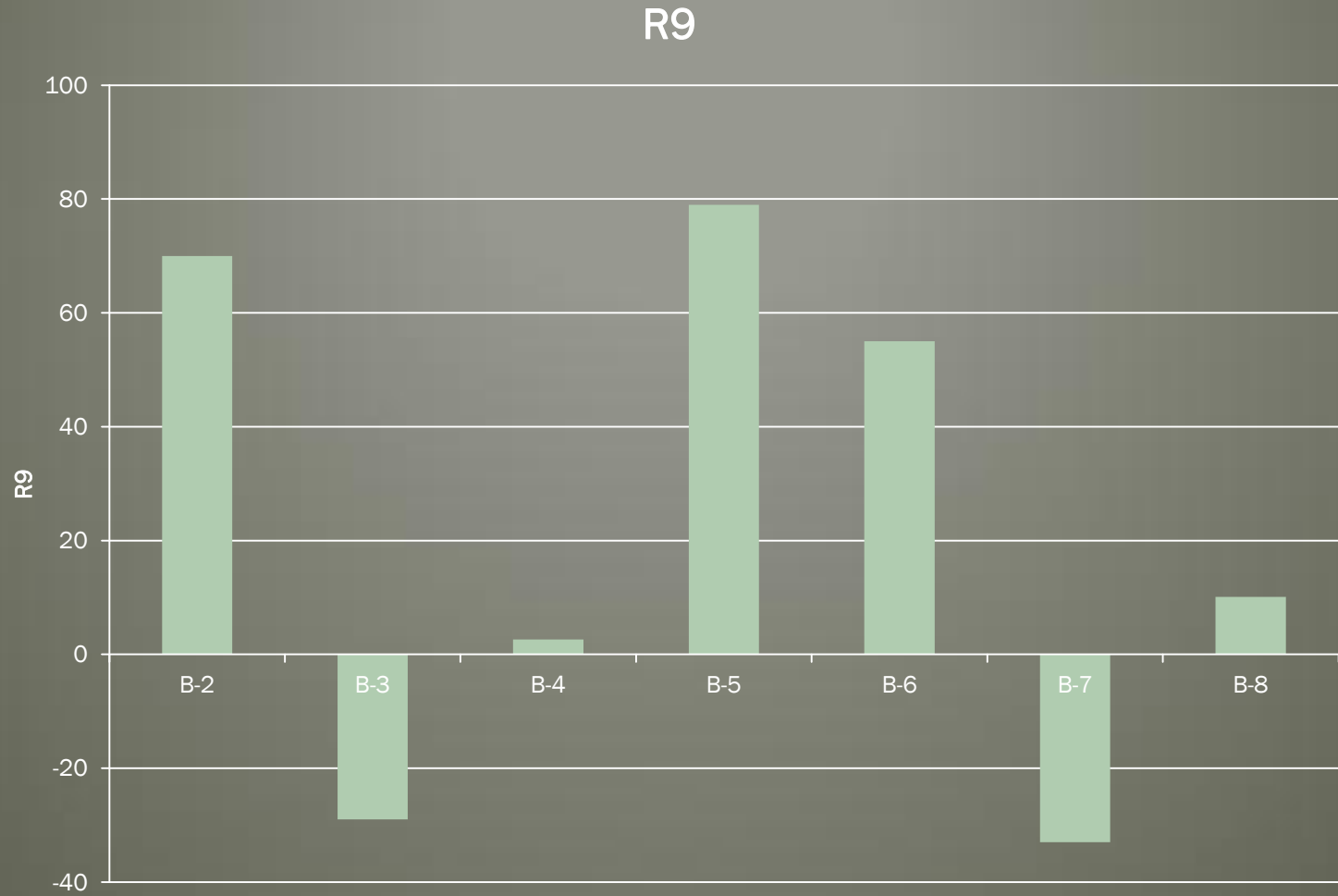


2-b-6 Ra

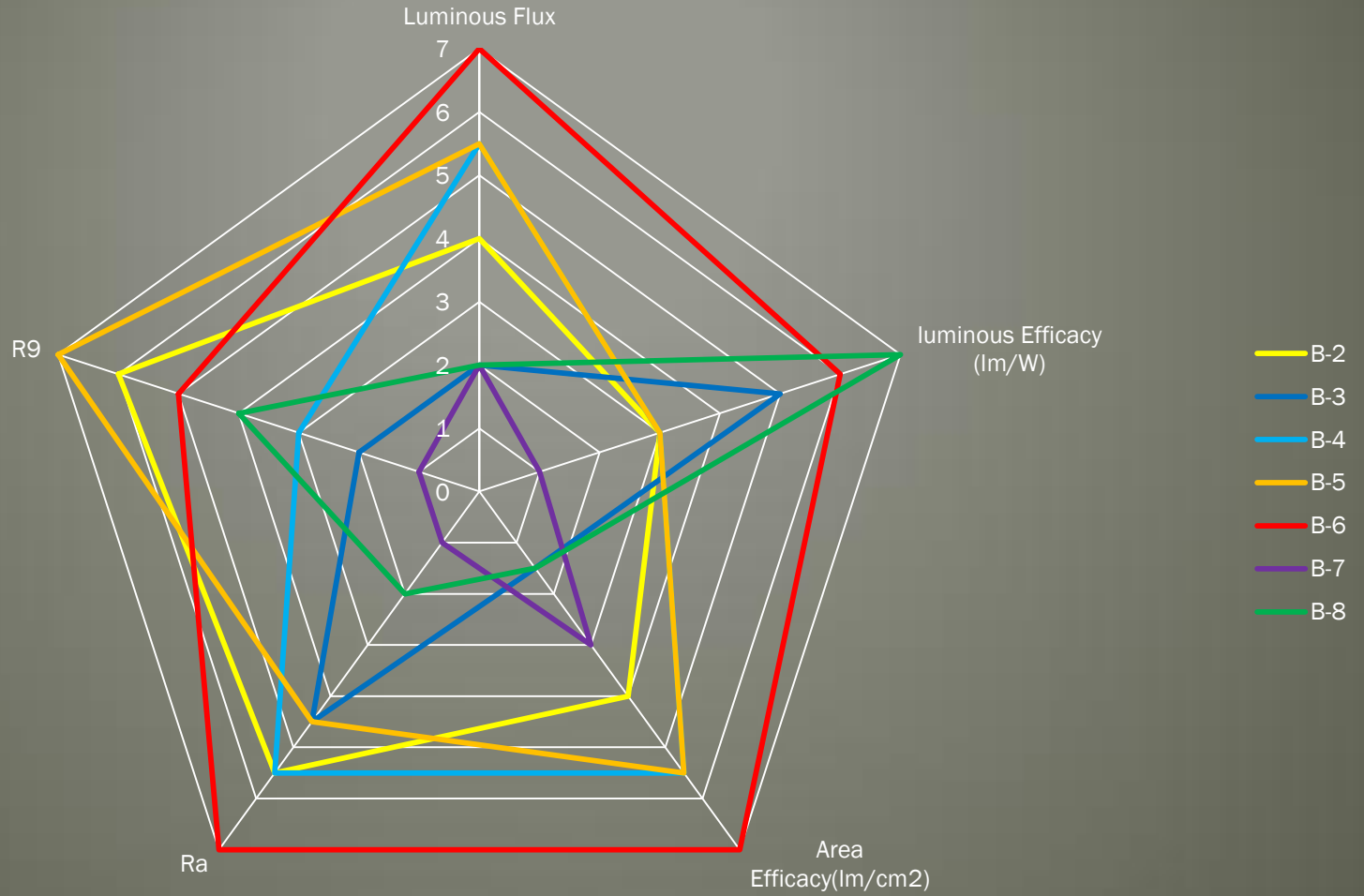
Ra



2-b-7 R9

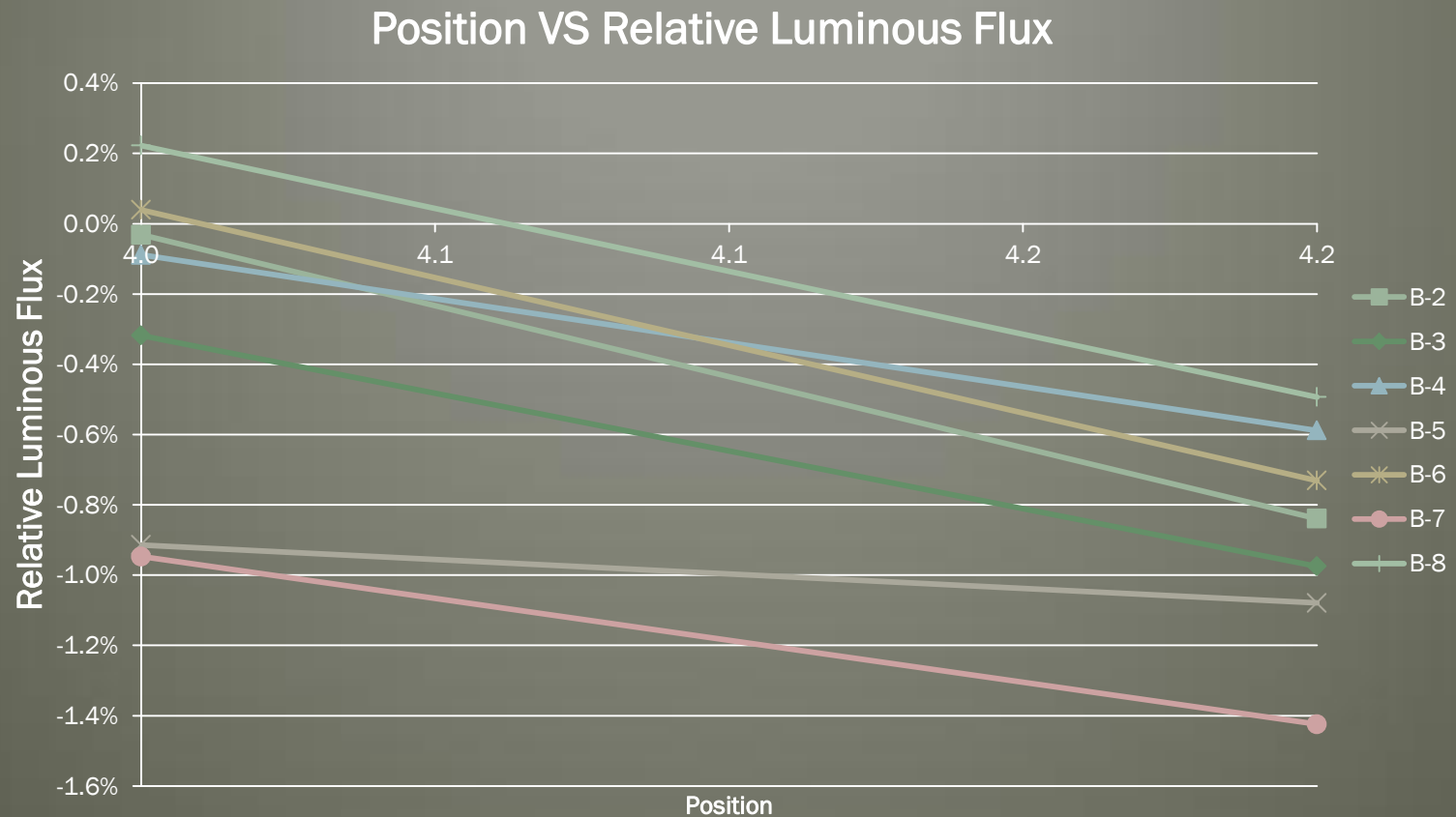


2-b-9 Summary



2-c Issues

2-c-1. Position dependent or Sphere error?



2-c-1. System for measurements on different positions

*1m tube coated black inside
color and luminance meter*

(CS-100)

Power supply

(E3617A)

IR thermometer

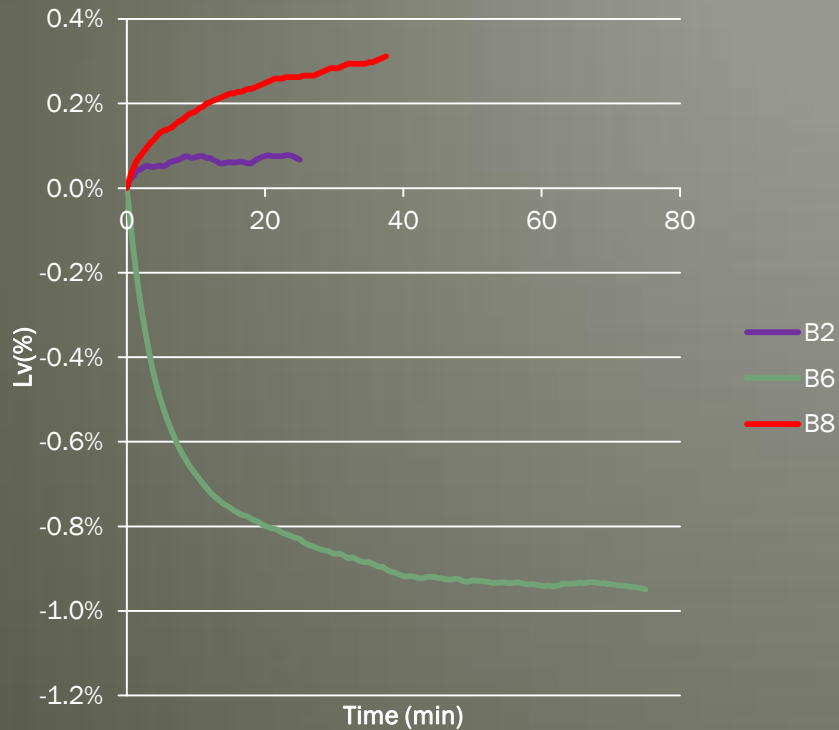
(DT-8380)



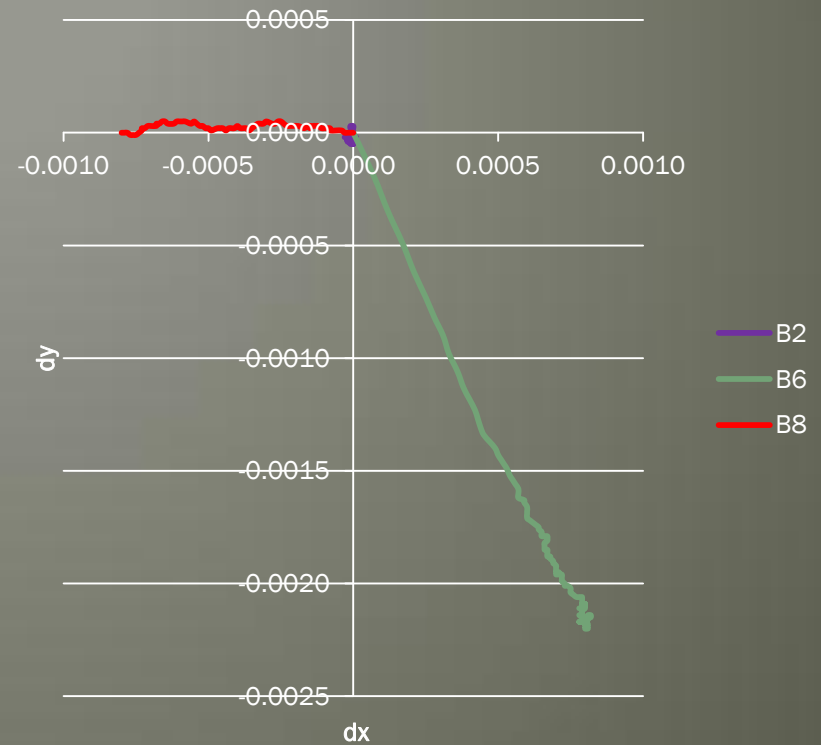
2-c Issues

2-c-2. Long time needed until stable

Drift of Lv(%)



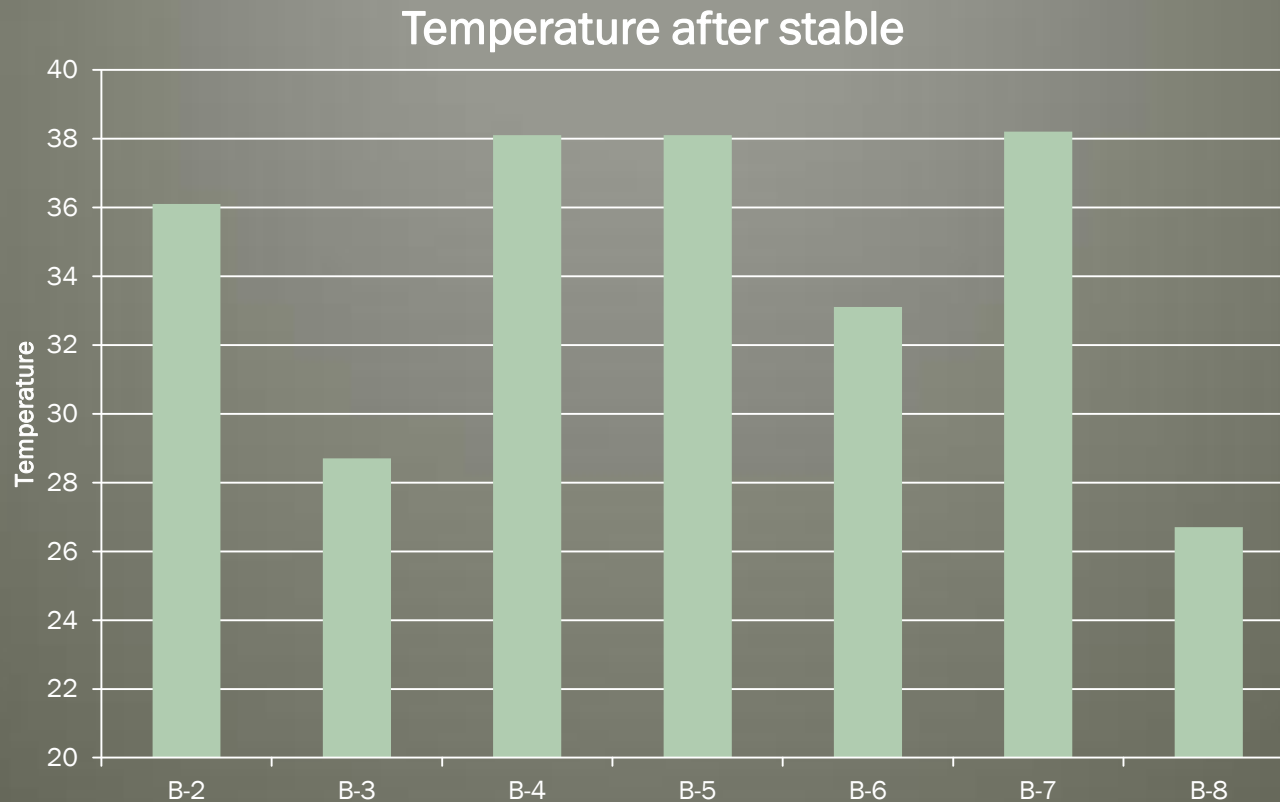
Drift of x,y



System 2π geometry with temperature controller may be useful.

2-c Issues

2-c-3. Data related to temperature?



System 2π geometry with temperature controller will be useful.

3. Test result about angular shift

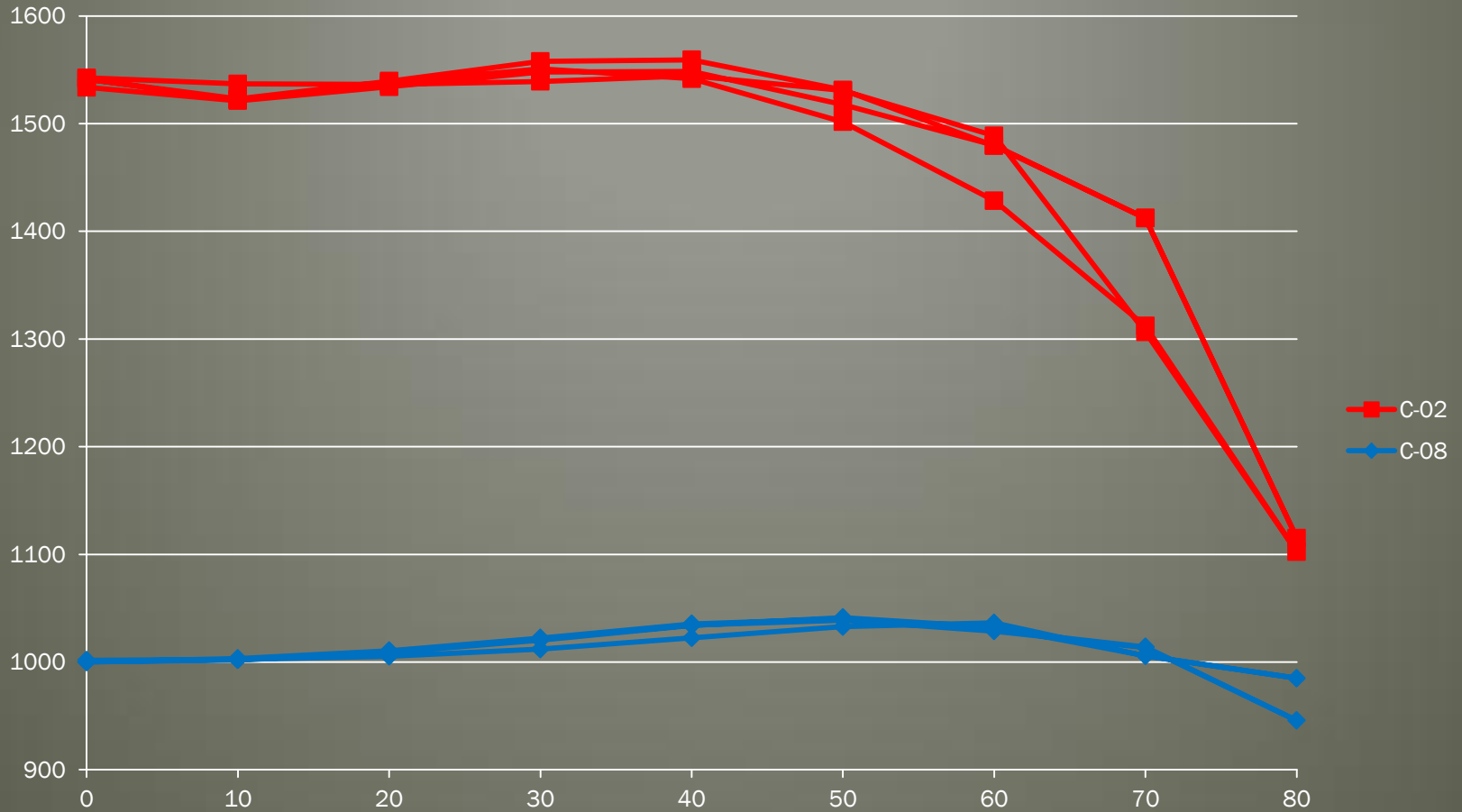
3-a. System for measurement

<i>Rotating stage + angular sensor</i>	<i>(ESP-300)</i>
<i>spectro-radiometer</i>	<i>(CS-2000A)</i>
<i>Power supply</i>	<i>(E3617A)</i>
<i>IR thermometer</i>	<i>(DT-8380)</i>



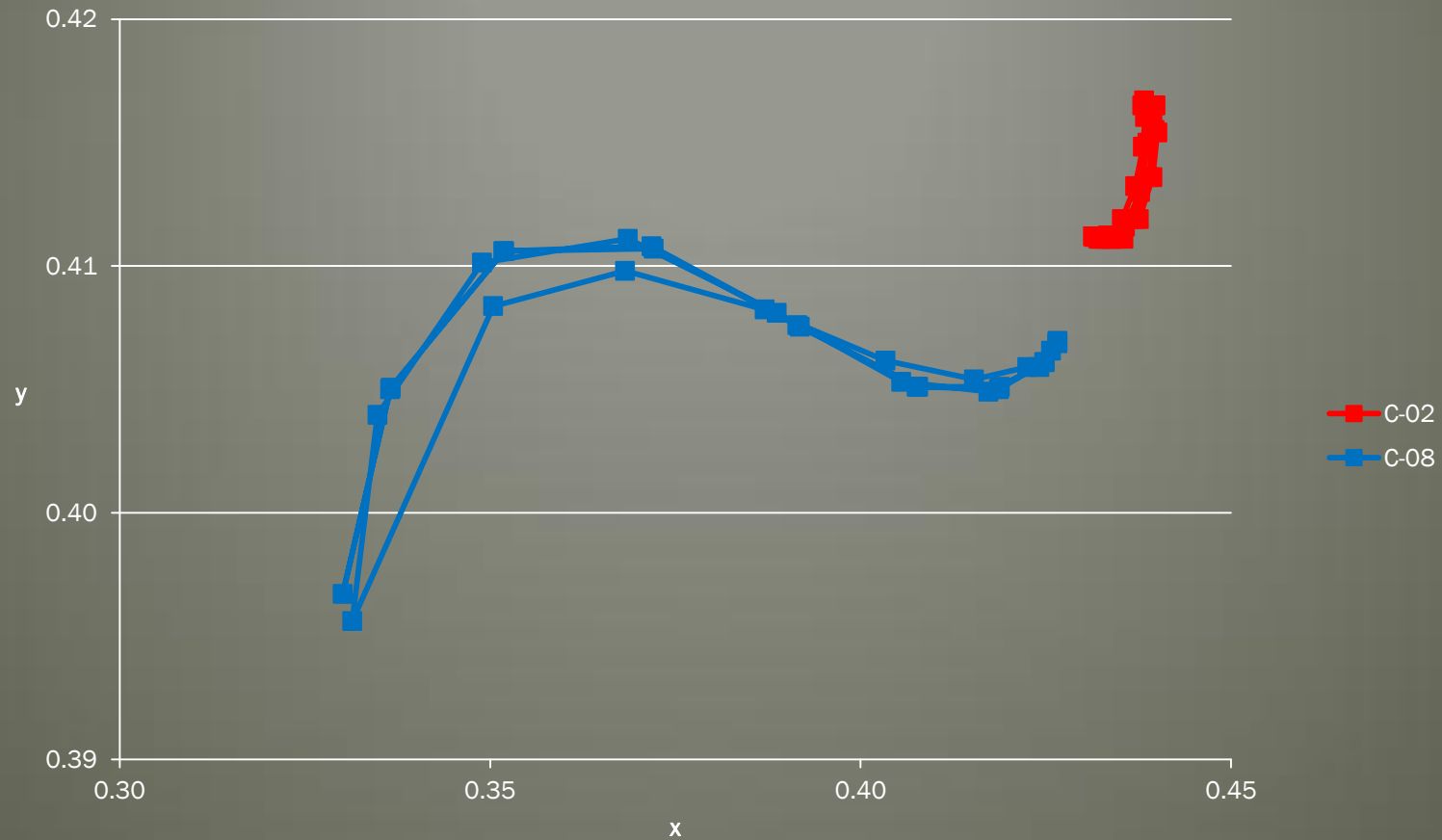
3-b-1 Angle VS Luminance

Lv 0-80 degree



3-b-2 Angle VS x,y

xy 0-80degree



4. *Issues about OLED measurement*

Angular Luminance + color shift of OLED must be measured.

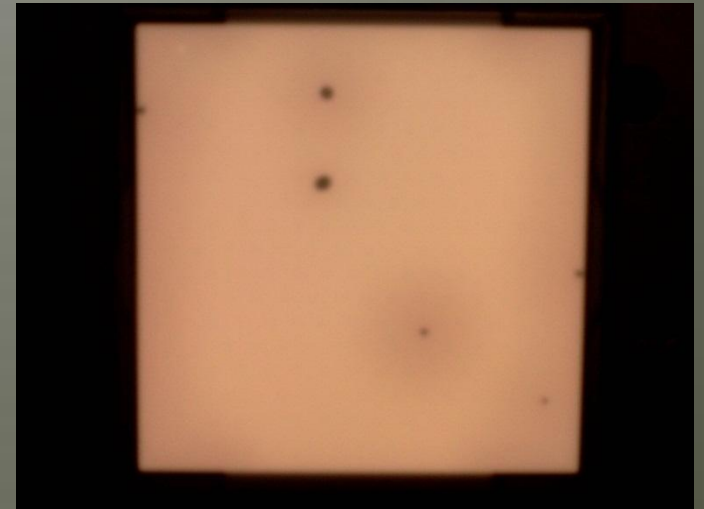
The best condition for measuring OLED should be researched.

Temperature, Geometry, Sphere position error

How should MURA (Luminance and color uniformity) be evaluated ?

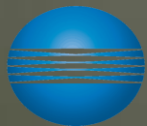
What should be defined for life time?

Spot error could be occurred.



Q&A

*Your opinion and suggestion
are welcome.*

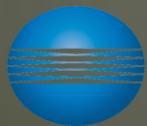


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Thank you for your attention



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