

# TUV-421 UV Fluorescent Lamps

## A New Technology for Reproducing Color Change Effects in QUV Accelerated Weathering Testers

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[View Recorded Presentation](#)

# Q-Lab's New Product Series

Today is the first of a two-part webinar series on new product releases from Q-Lab

All upcoming and archived webinars can be accessed at:

[q-lab.com/webinars](http://q-lab.com/webinars)

Date	Topic
24 Apr	TUV-421 Lamps
01 May	Q-SUN Xe-8 Xenon Arc Tester

# Administrative Notes

You'll receive a follow-up email from [info@email.q-lab.com](mailto:info@email.q-lab.com) with links to a survey, registration for future webinars, and to download the slides

Use the **Q&A feature in Zoom** to ask us questions today!



We make testing simple.

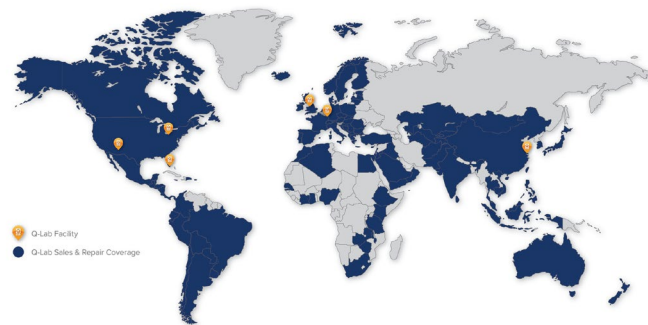


**Thank you for attending our webinar!**

We hope you found our webinar **QUV TUV-421 Lamps** to be helpful and insightful. You can [download today's presentation](#) at any time - a link to the recording is included on the title slide. Subtitles can be accessed through YouTube for the video recording.

# Q-Lab

- World Leader in Weathering & Corrosion testing
  - Xenon arc
  - UV fluorescent
  - Cyclic corrosion
- Testing services
  - ISO 17025-accredited labs
  - Florida and Arizona outdoor
  - Q-TRAC and AIM box accelerated outdoor
- Founded as Q-PANEL standard substrates in 1956
  - Aluminum
  - Steel
- Worldwide locations: USA, UK, Germany, China



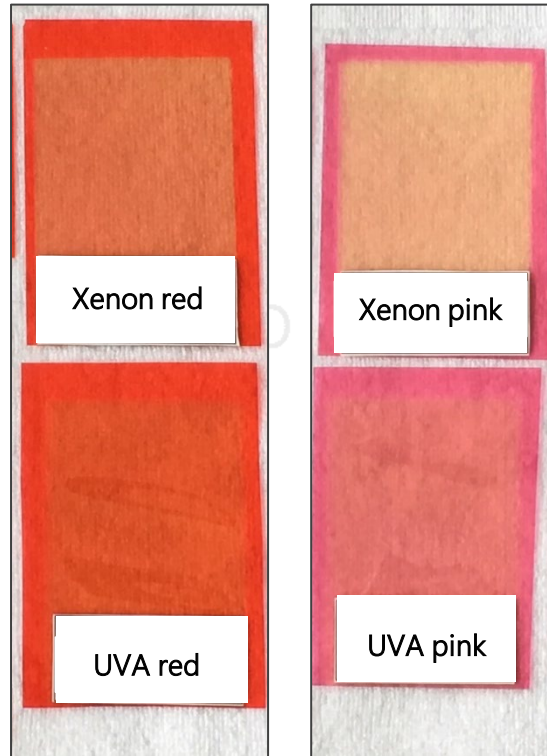
# Color Fade and Light Spectrum

## Xenon arc

Light source **with**  
long-wavelength UV  
and visible

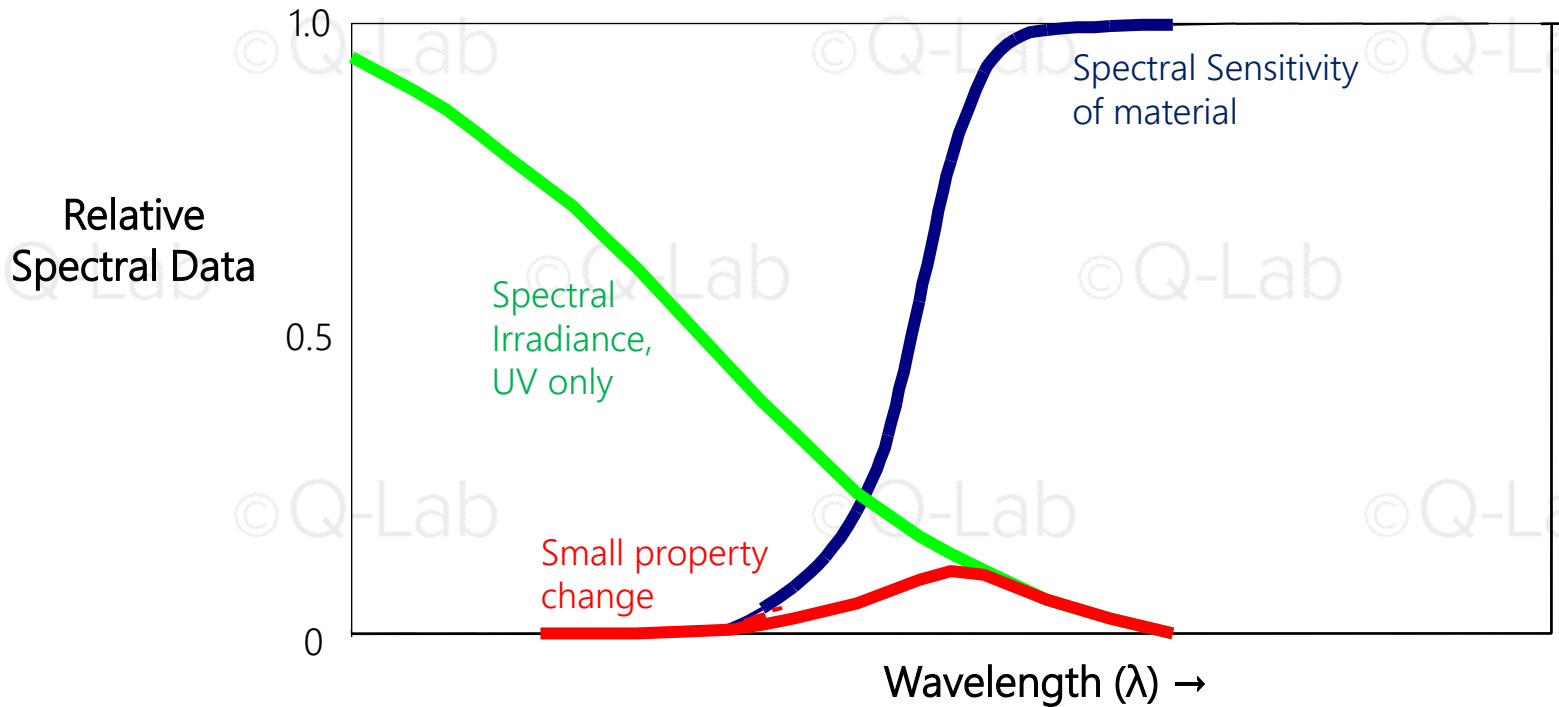
## UVA-340

Light source **without**  
long-wavelength UV  
and visible

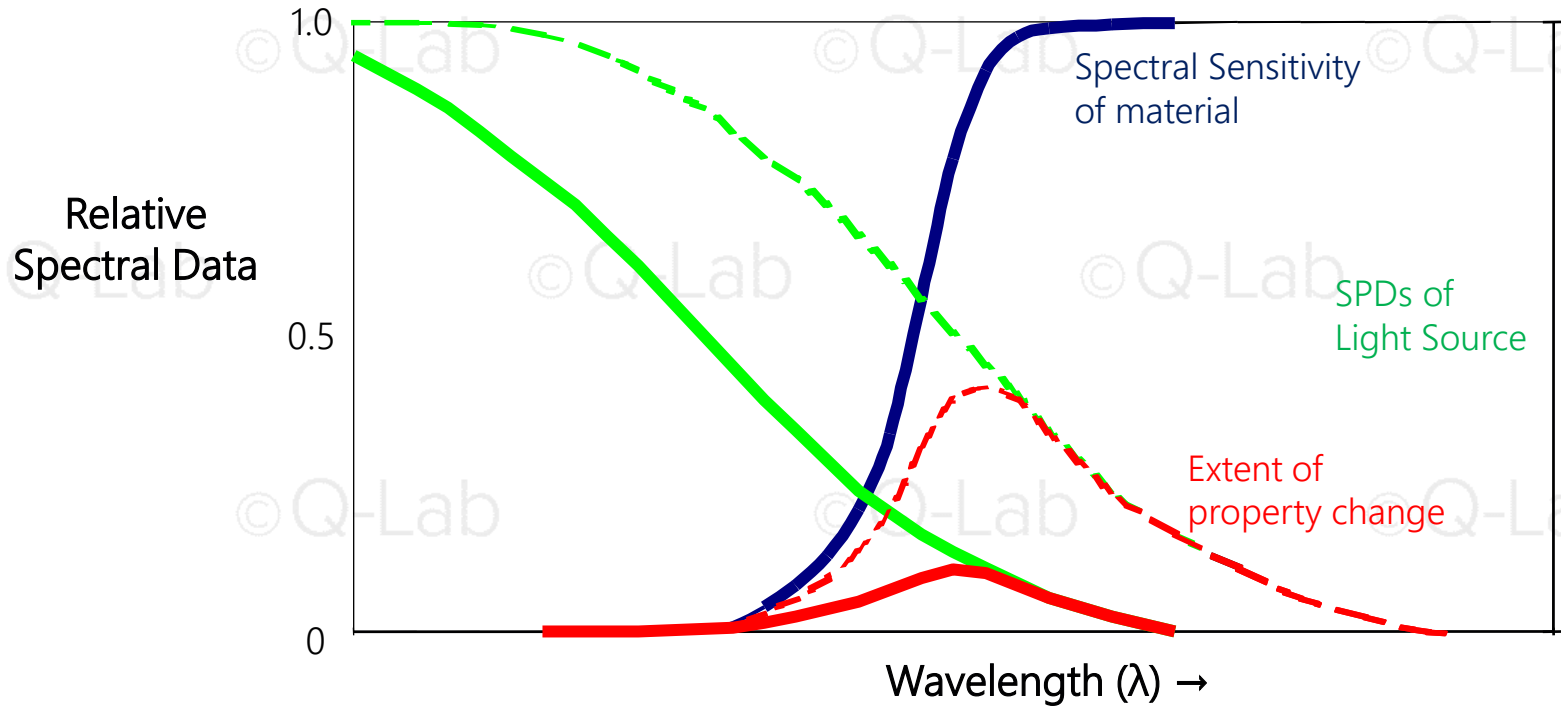


- Greater color fade seen here for full-spectrum light
- Some materials are sensitive to longer-wavelength light
- UV-only light sources may not properly replicate some materials degradation, like color fade

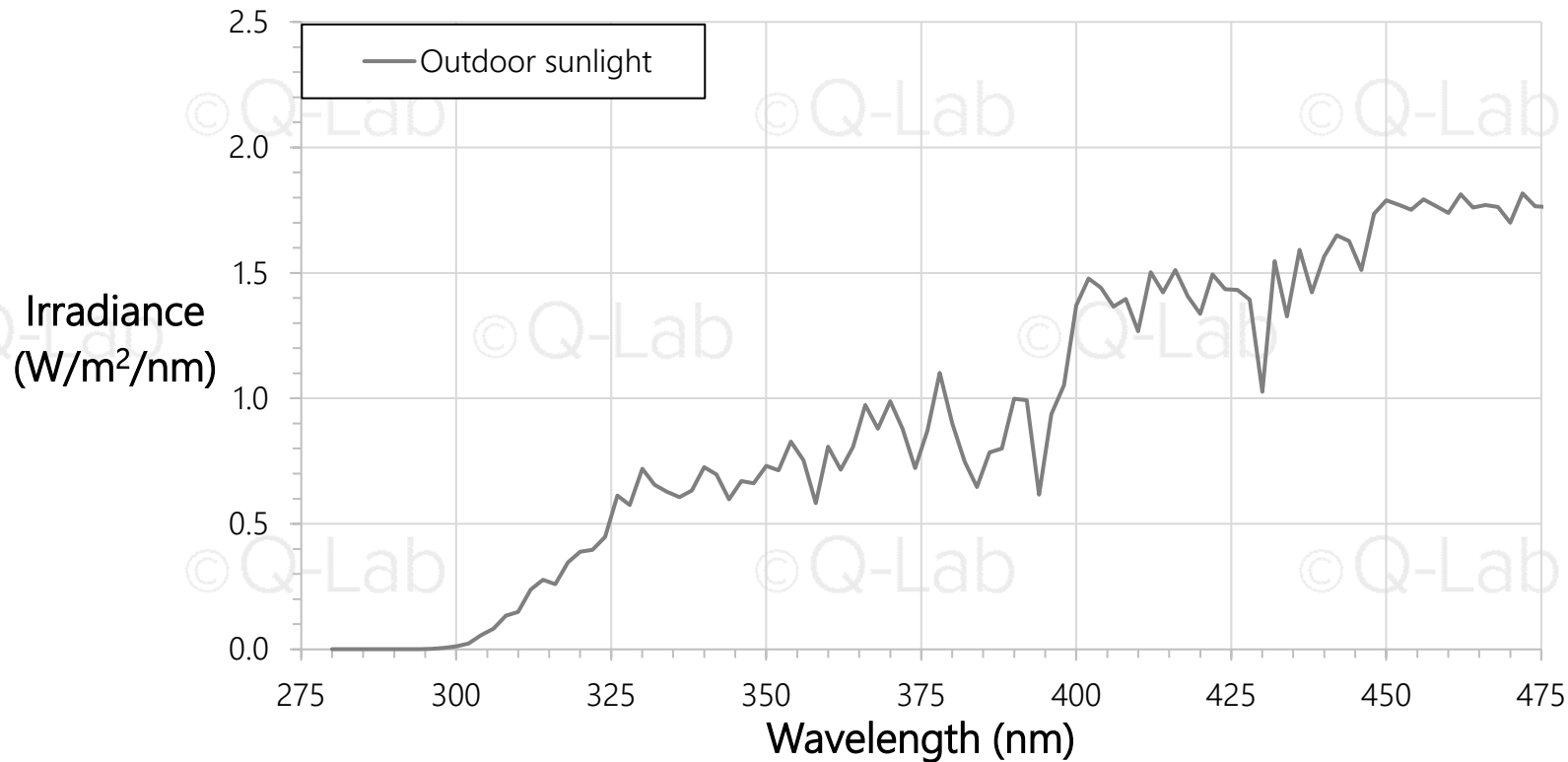
# Spectral Sensitivity



# Spectral Sensitivity

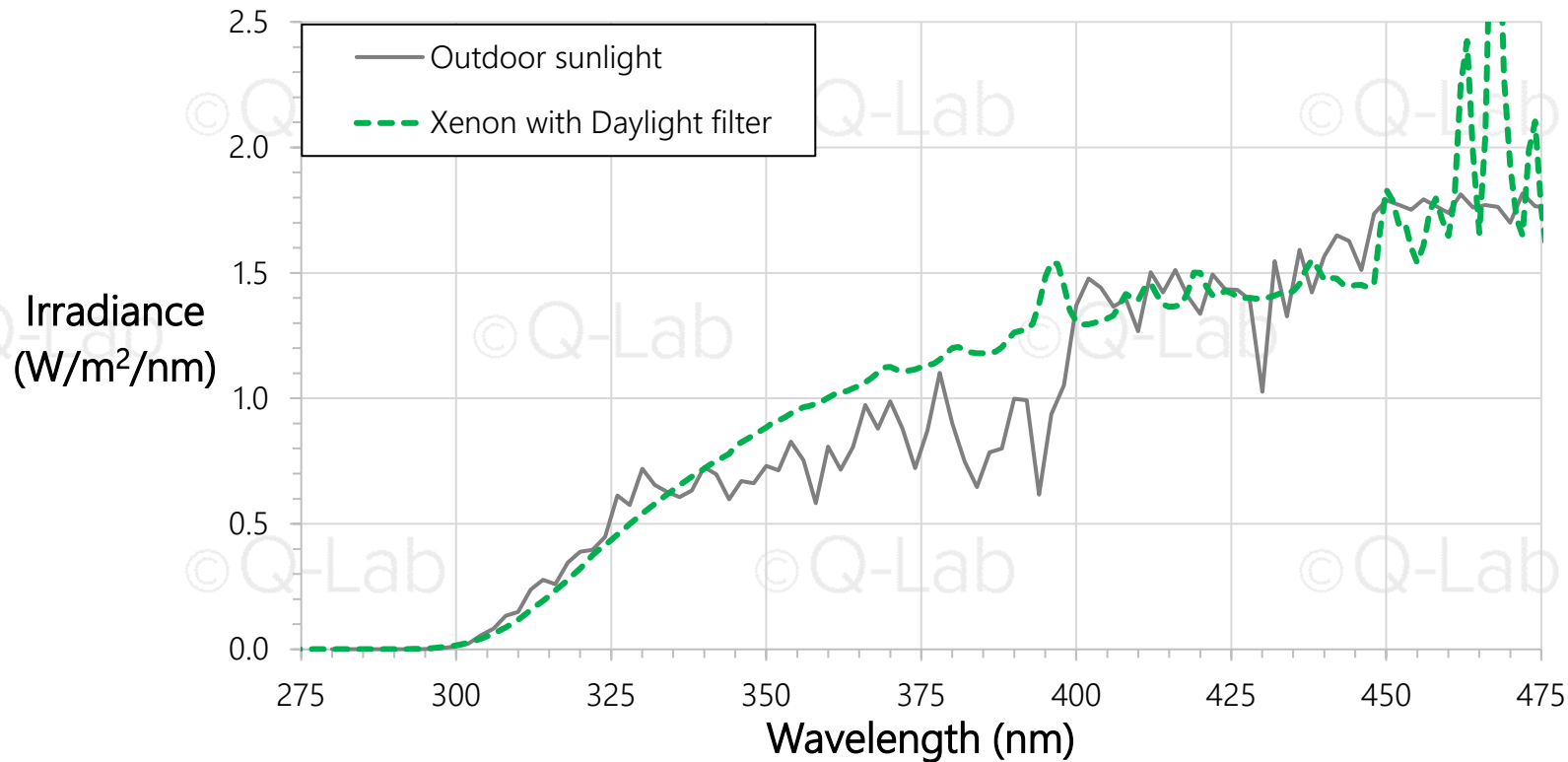


# Spectral Irradiance

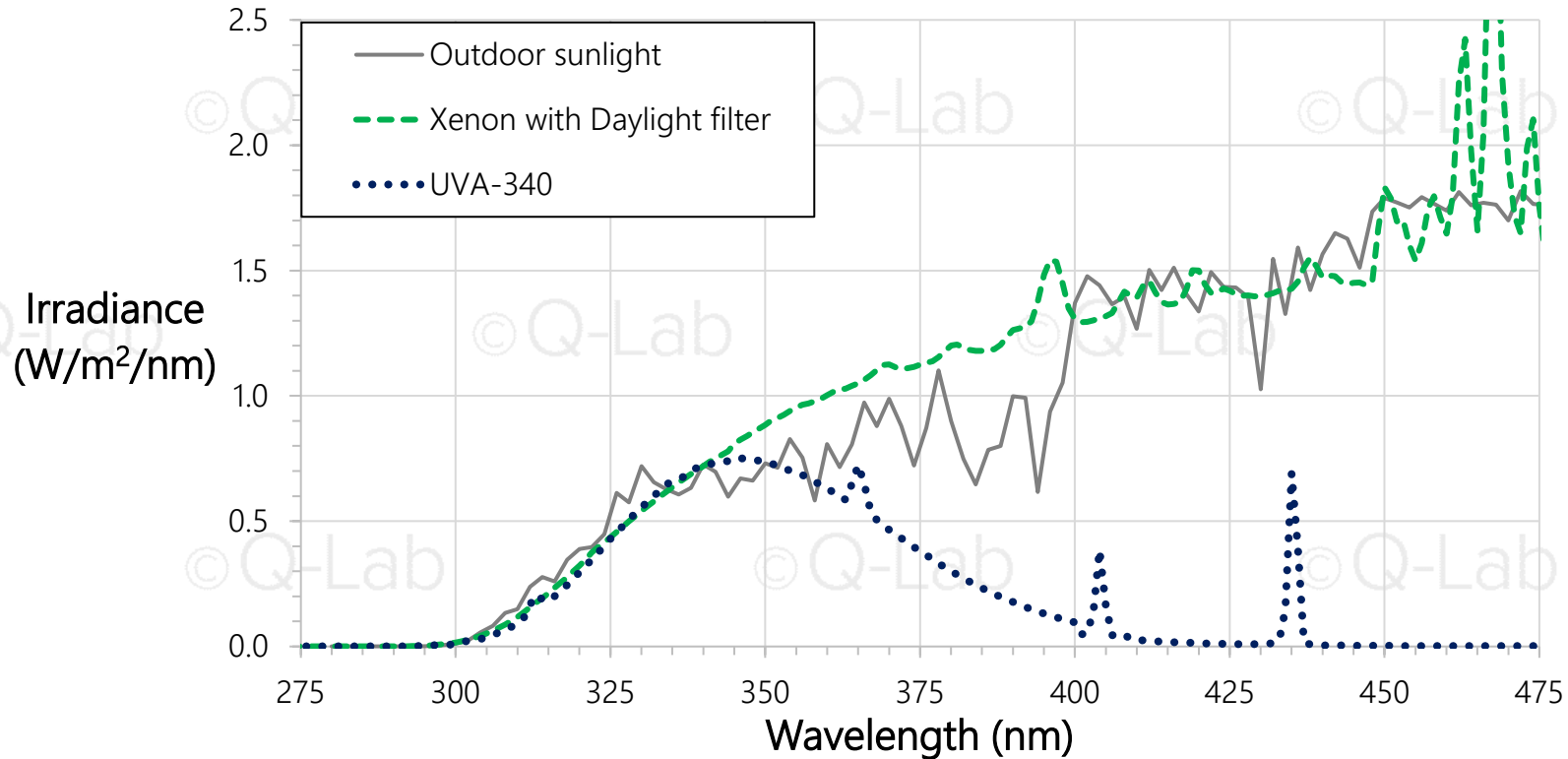




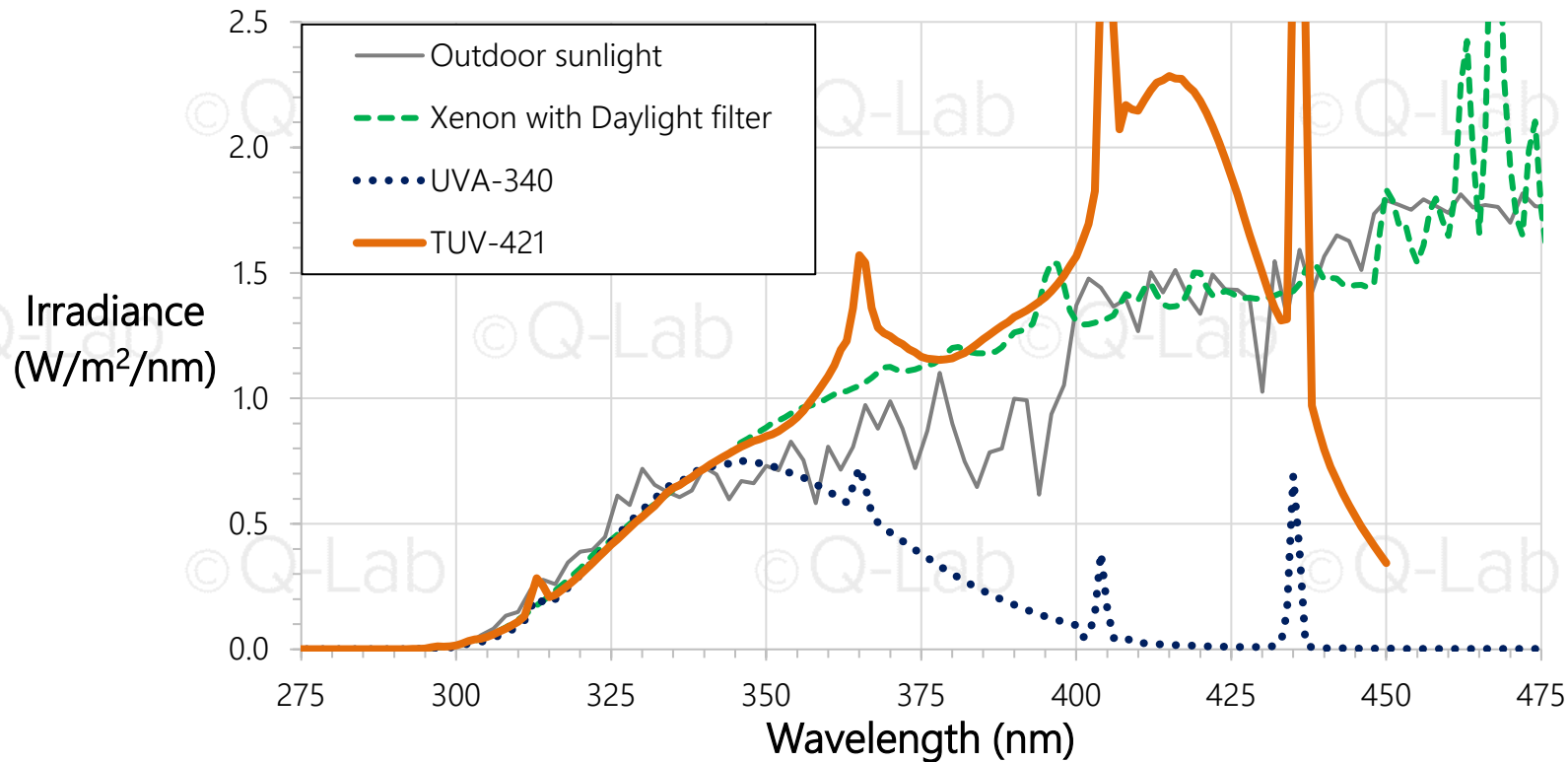
# Spectral Irradiance



# Spectral Irradiance



# Spectral Irradiance



# TUV-421 Lamps

- New UV fluorescent light source with a spectrum extending to longwave UV and shortwave visible light
- Testing with several types of materials – coatings, printing inks
- Evaluate correlation to known exposure types – UVA fluorescent, xenon arc with daylight filters



# Painted Panels Exposure

# Painted Panels

- Aluminum substrates
- Commercially-available spray paint
- Intermediate durability
- Organic pigments



# Exposure Details

## 2000 hour test

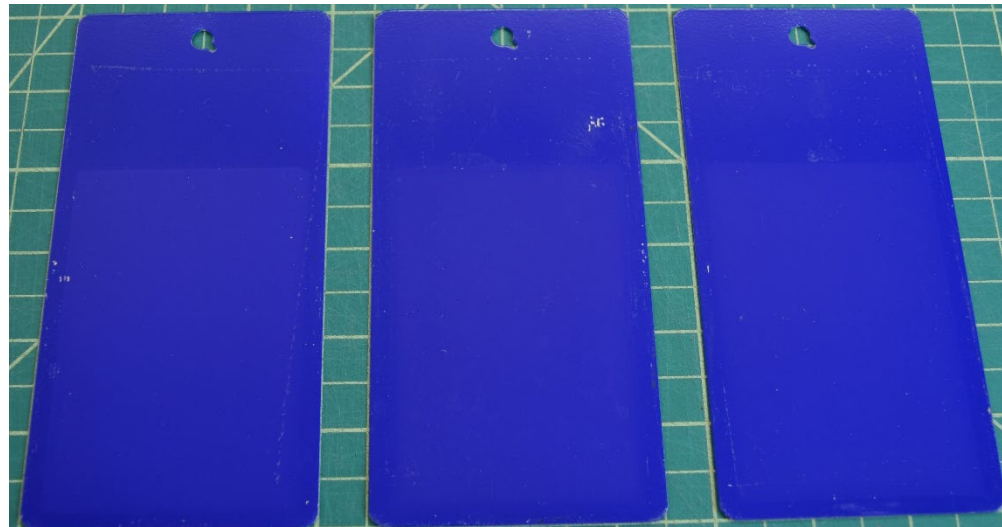
Light Source	Apparatus	Irradiance (W/m <sup>2</sup> )	Black Panel Temp (°C)	Chamber Conditions
Xenon arc (Type I Daylight)	Xenon	60 @300-400 nm	60	Chamber Air 45 °C Relative Humidity 50%
TUV-421	UV Fluorescent	60 @300-400 nm	60	n/a
UVA-340	UV Fluorescent	0.55 @340 nm	60	n/a

*No liquid water*

# Paint Exposures

## Dark Blue

- Very little change from all exposures
- $\Delta E < 2.0$
- Control experiment



Xenon arc  
(Daylight)

TUV-421

UVA-340



# Paint Exposures

## Red

- Very little change from all exposures
- $\Delta E < 1.5$
- Control experiment



Xenon arc  
(Daylight)

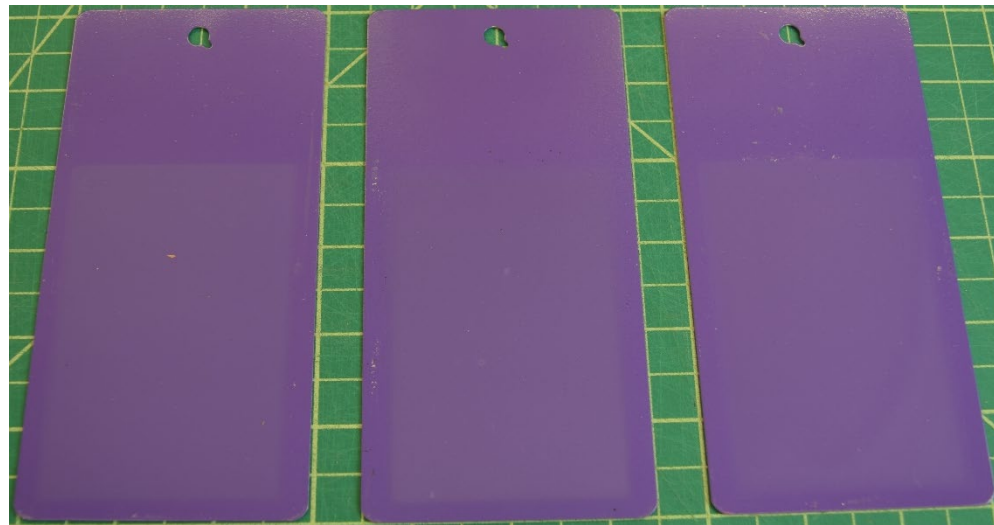
TUV-421

UVA-340

# Paint Exposures

## Purple

- Some change observed in all exposures
- Closer match between TUV-421 and xenon ( $\Delta E \sim 3.7$ ) than UVA-340 ( $\Delta E \sim 2.9$ )



Xenon arc  
(Daylight)

TUV-421

UVA-340

# Paint Exposures

## Orange

- Significant fade in all three exposures
- More fade observed for both TUV-421 and Xenon arc
- Xenon arc produced the greatest change



Xenon arc  
(Daylight)

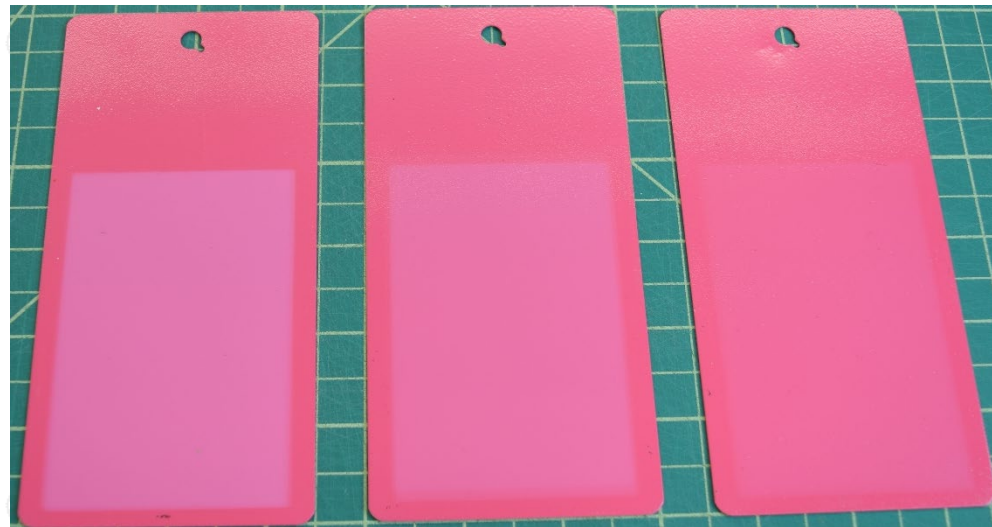
TUV-421

UVA-340

# Paint Exposures

## Pink

- Clearest difference observed between UVA-340 and other exposures
- Indicates spectral sensitivity to longer wavelengths
- Greater absolute change in xenon than TUV-421

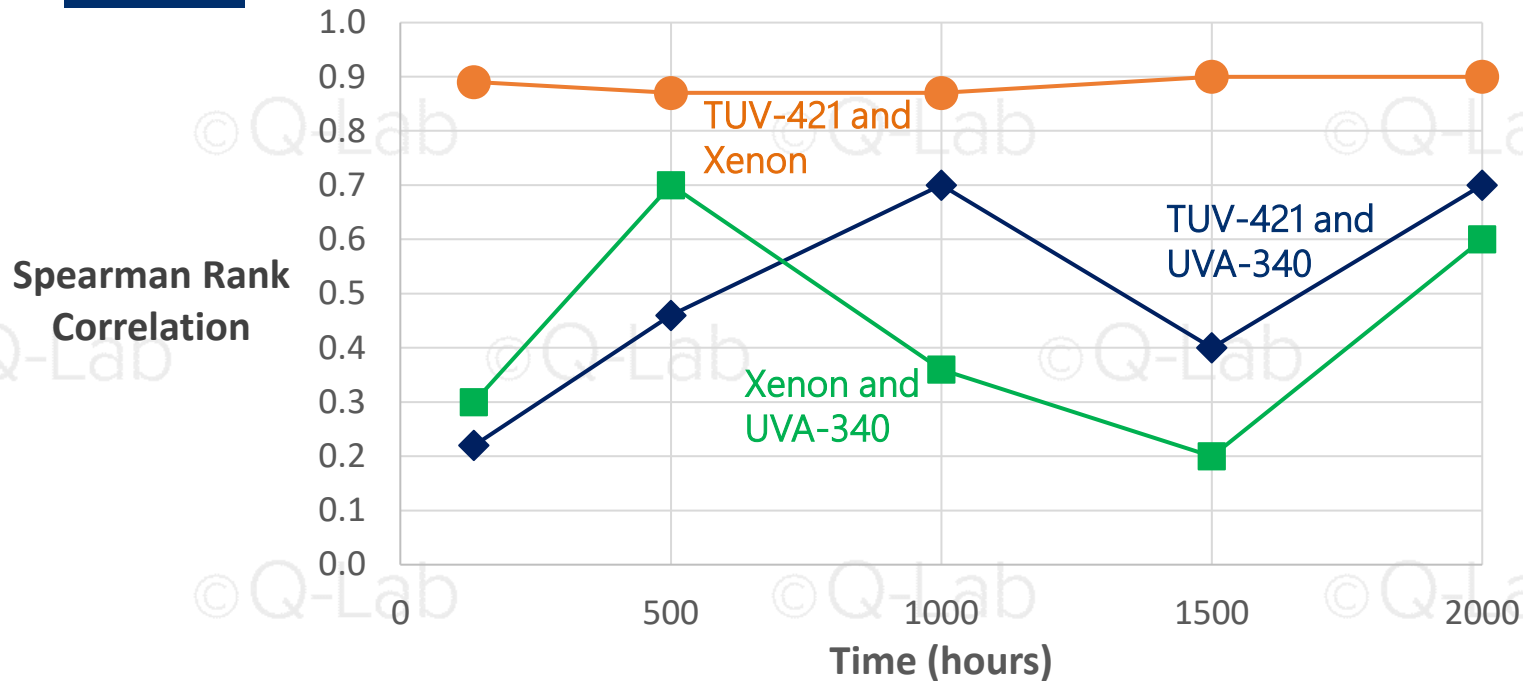


Xenon arc  
(Daylight)

TUV-421

UVA-340

# Paint Exposure Summary

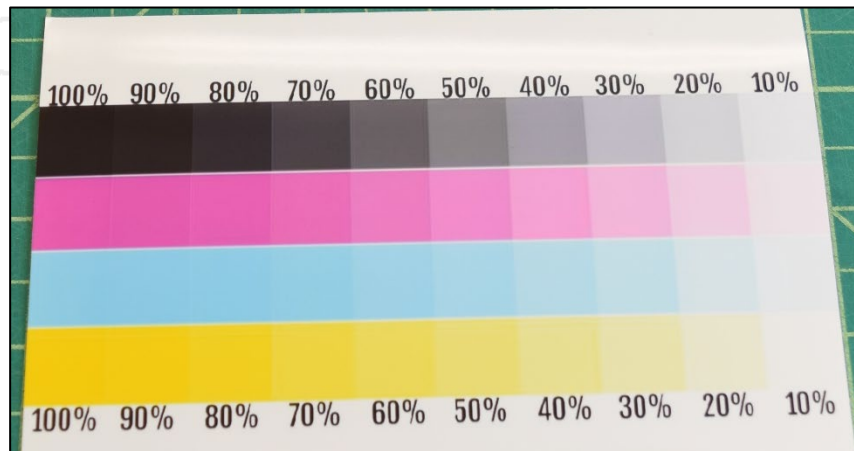


Best correlation observed between TUV-421 and Xenon Arc

# Photo Paper Exposure

# Photo Paper

- “Premium Digital Paper” – commercially-available photo development paper
- Four colors: black, magenta, cyan, and yellow
- Ink saturation from 10-100%



# Exposure Details

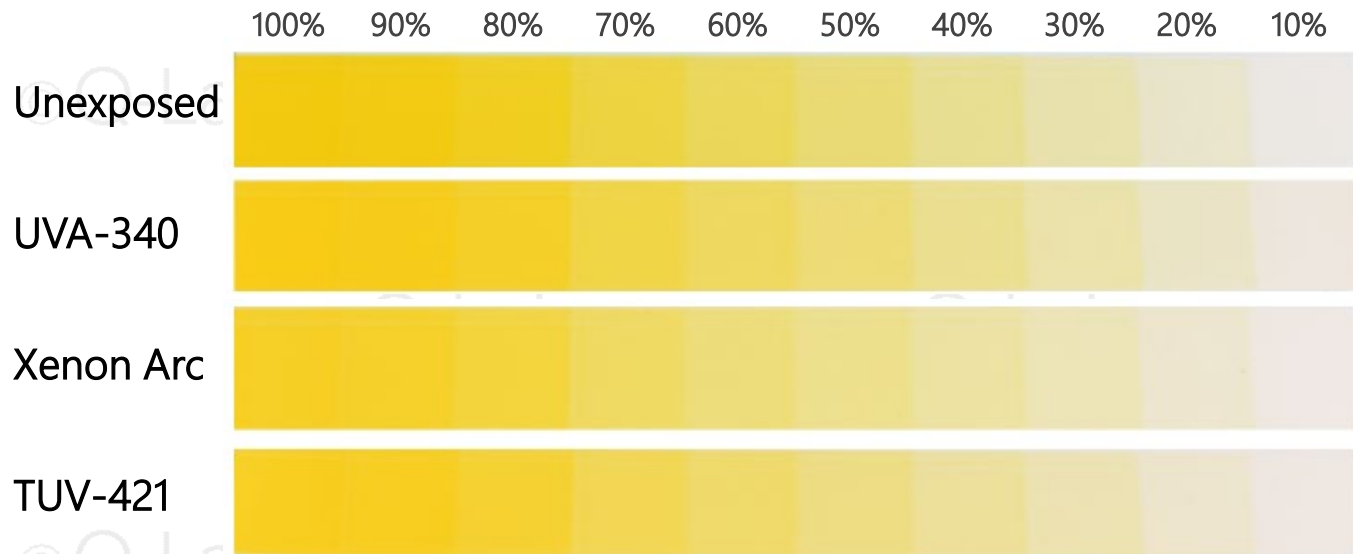
## 96 hour test

Light Source	Apparatus	Irradiance (W/m <sup>2</sup> )	Black Panel Temp (°C)	Chamber Conditions
Xenon arc (Type I Daylight)	Xenon	60 @300-400 nm	45	Chamber Air 30 °C Relative Humidity ---
TUV-421	UV Fluorescent	60 @300-400 nm	45	n/a
UVA-340	UV Fluorescent	0.55 @340 nm	45	n/a

*No liquid water*

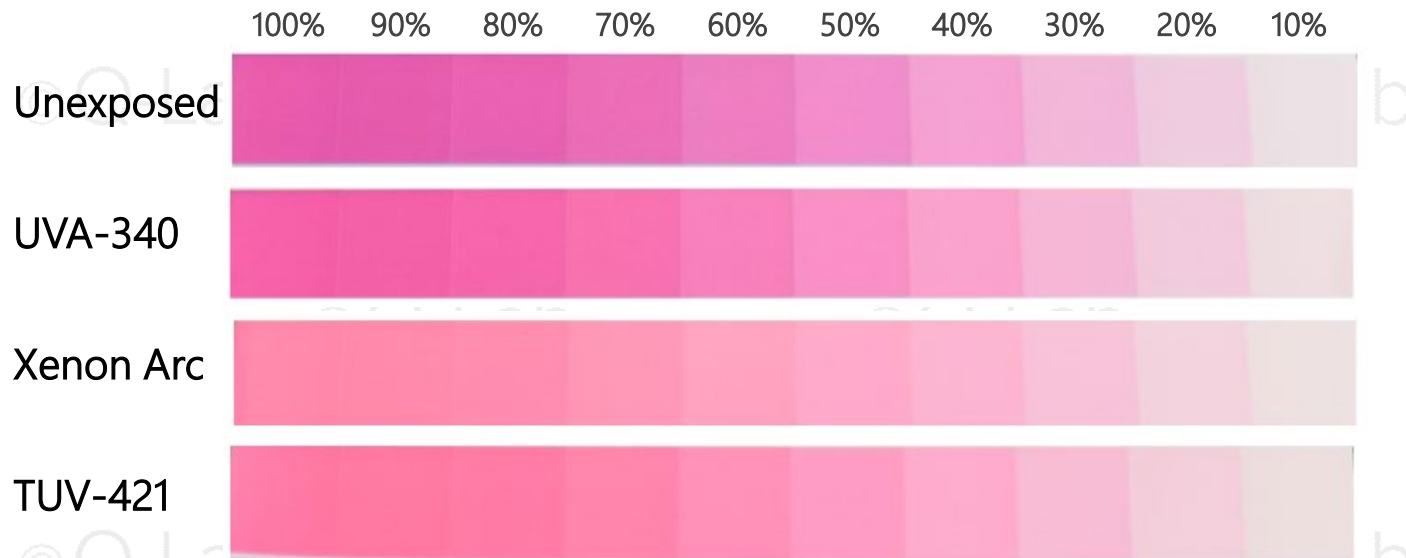


# Yellow Ink



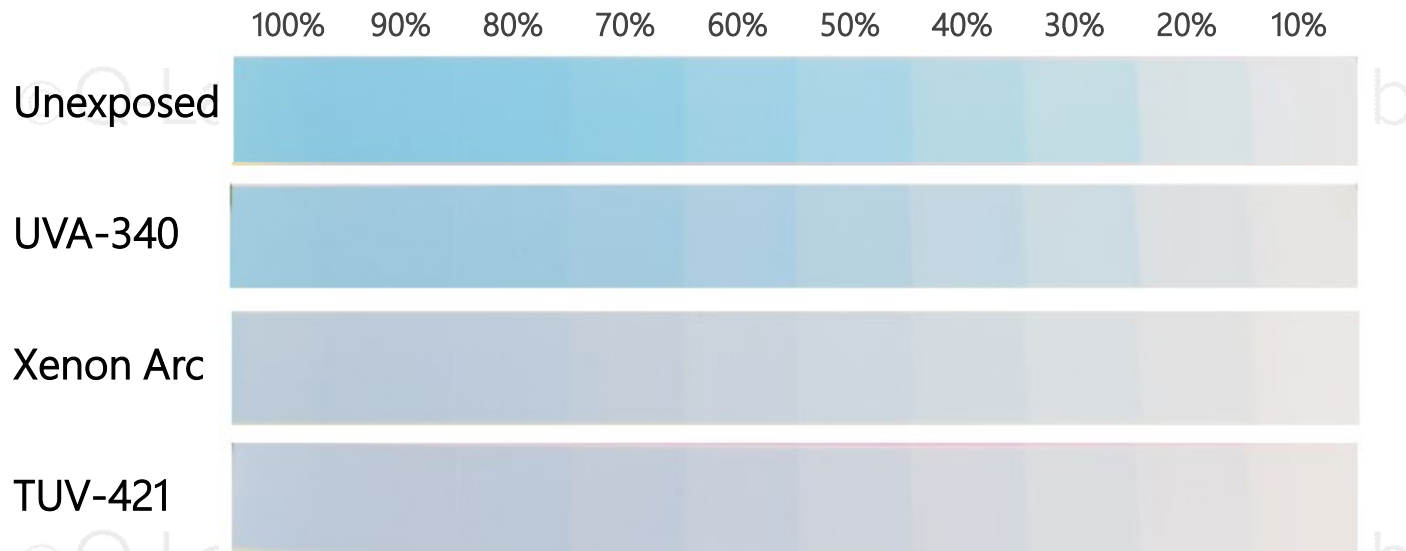
- Very little change from any exposure
- Small fade from xenon arc and TUV-421

# Pink Ink



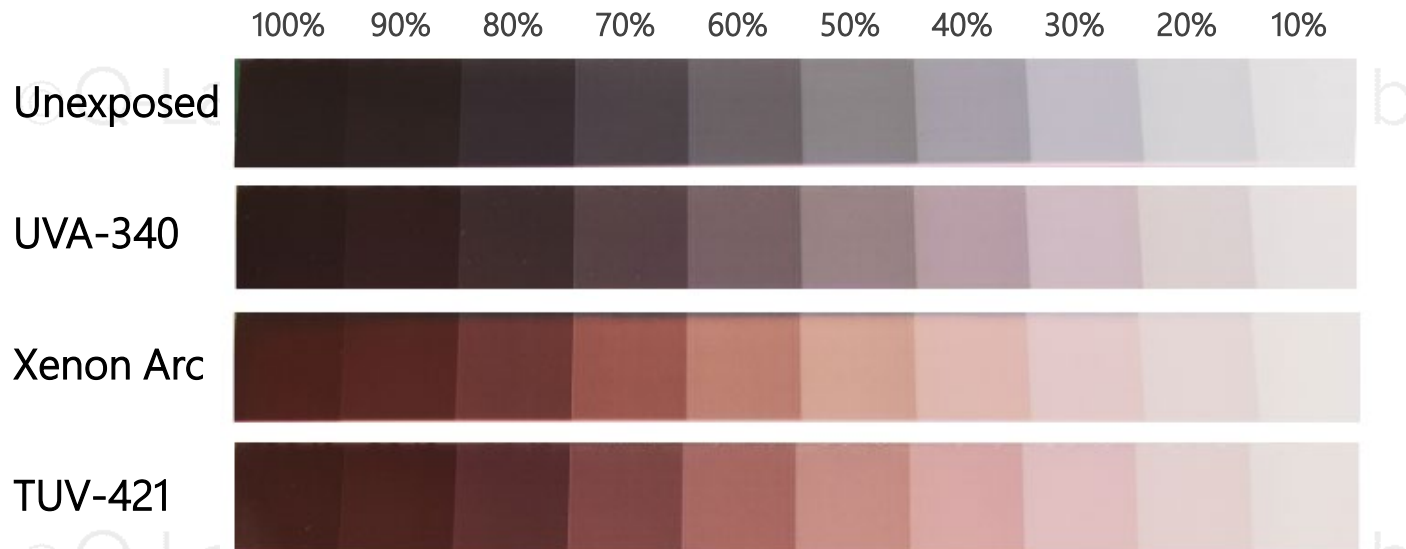
- Most change from Xenon Arc, followed by TUV-421
- Least change from UVA-340

# Blue Ink



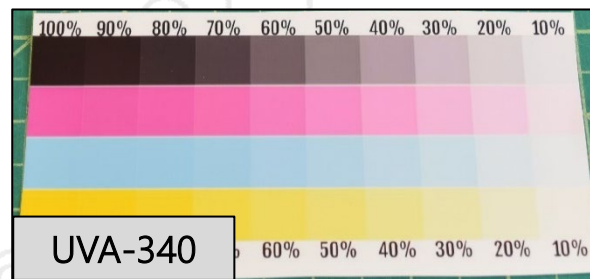
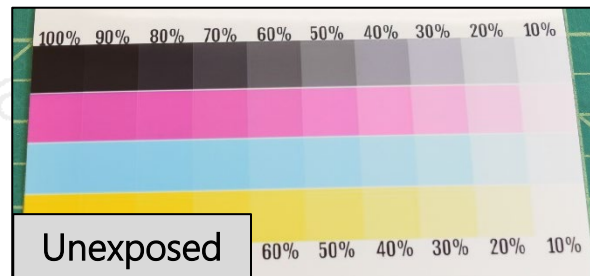
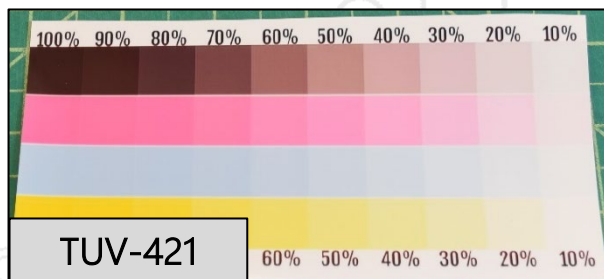
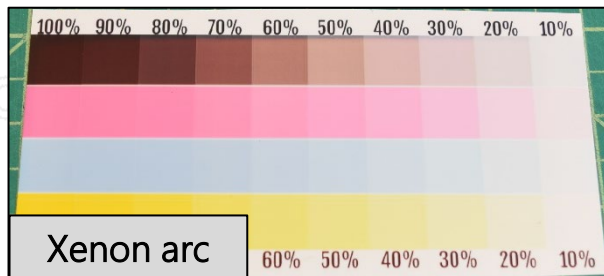
- Xenon Arc and TUV-421 cause similar amount of fade
- Very little change from UVA-340

# Black Ink



- Xenon Arc and TUV-421 cause similar amount of fade
- Very little change from UVA-340

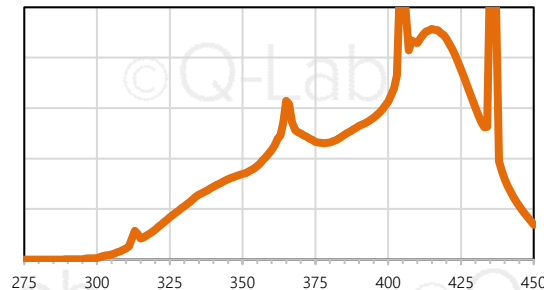
# Photo Paper Summary



- Photo paper color fade correlated very well between Xenon arc and TUV-421
- UVA-340 exposures did not produce much color fade of these inks

# Summary

- New UV fluorescent lamp (TUV-421) delivers extended spectrum
  - Long-wavelength UV light
  - Short-wavelength visible light
- 2000 hour exposure on painted Al panels shows excellent correlation between TUV-421 and xenon arc exposures
- 96 hour exposure of printed inks on photo paper shows excellent color fade agreement between TUV-421 and xenon arc, with UVA-340 producing little to no color fading



# Future Work

- Incorporate liquid water into laboratory test cycles
- Test other materials
  - Textiles
  - Plastics
- Compare results to outdoor testing
- What material would *you* like to test for color fade?

Thank you for your time!

*Questions?*  
info@q-lab.com

We make testing simple. |

