



The Shepherd Color Company
We Brighten Lives

Ultra-High Performance Yellow and Orange Pigments

A stack of white paper napkins is placed on a light-colored wooden table. The napkins are slightly fanned out, showing their edges. A solid red rectangular box is superimposed over the center of the napkins, containing the text "WHAT IF?" in white, bold, uppercase letters.

WHAT IF?



WHAT IF?



WHAT IF?

NO MORE COMPROMISES

STOP SETTling FOR 'PRETTY GOOD'

CHROMATIC



OPAQUE

DURABLE

BRIDGE THE GAP



MORE
COLORS

MORE
DURABILITY

MORE
RELIABLE





The Shepherd Color Company
We Brighten Lives



**MORE
EXPERTISE**



**BETTER
PERFORMANCE**



**BEST
VALUE**

THE COLORS YOU WANT

WE BRIGHTEN LIVES





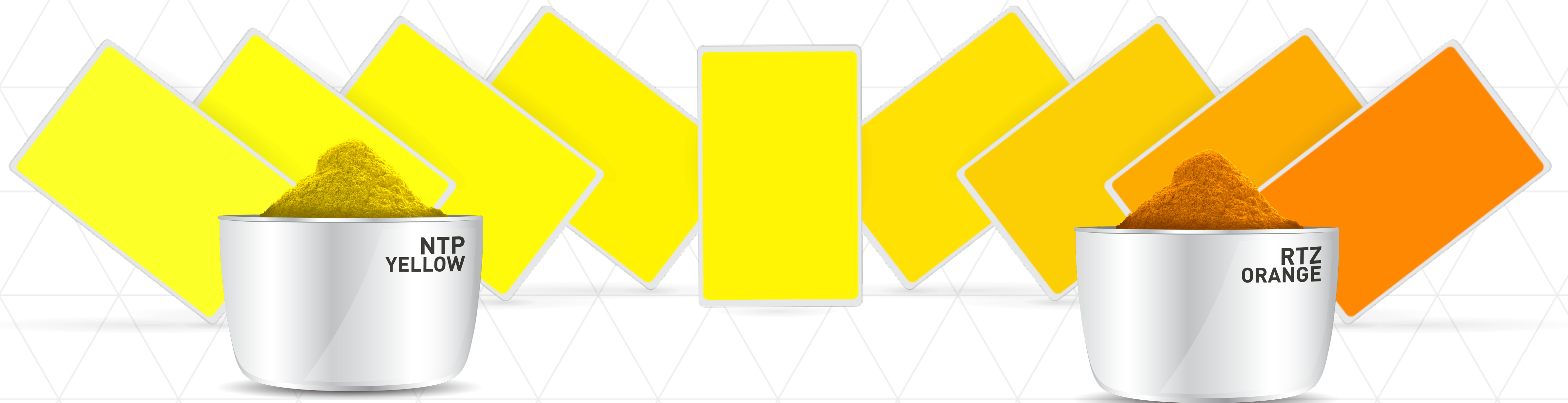
FOR TODAY

Introduction to new technology

Example of performance

Applications

THE NEW FRONTIER







NO MORE
“FIGURE IT OUT”

MORE COLORS





MORE COLORS

You won't have to compromise
the color you want for the
standards you have to meet.

Chromium and Lead Free

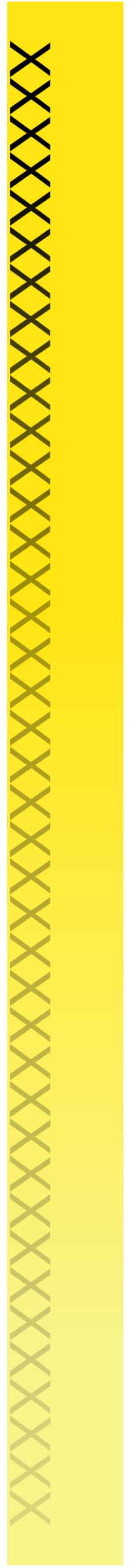
Excellent Opacity

Aesthetically Pleasing Color

More Chromatic (Brighter)

Chroma

Less Chromatic (Duller)



Yellow

Orange

Red

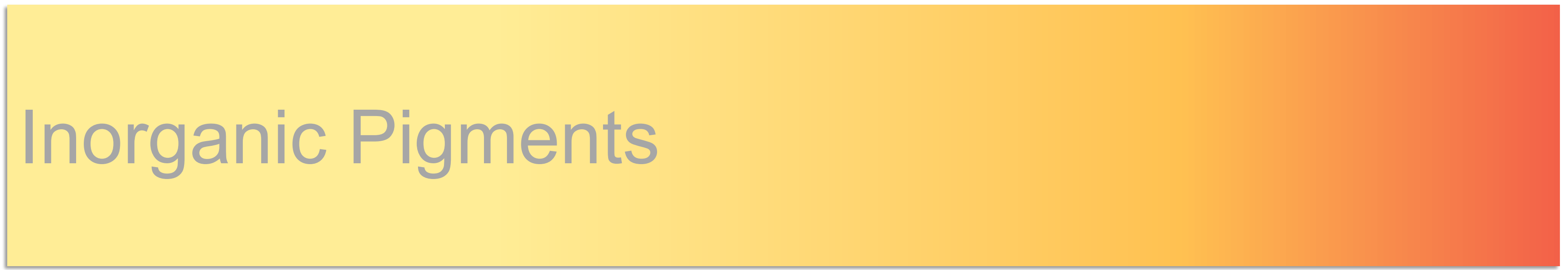
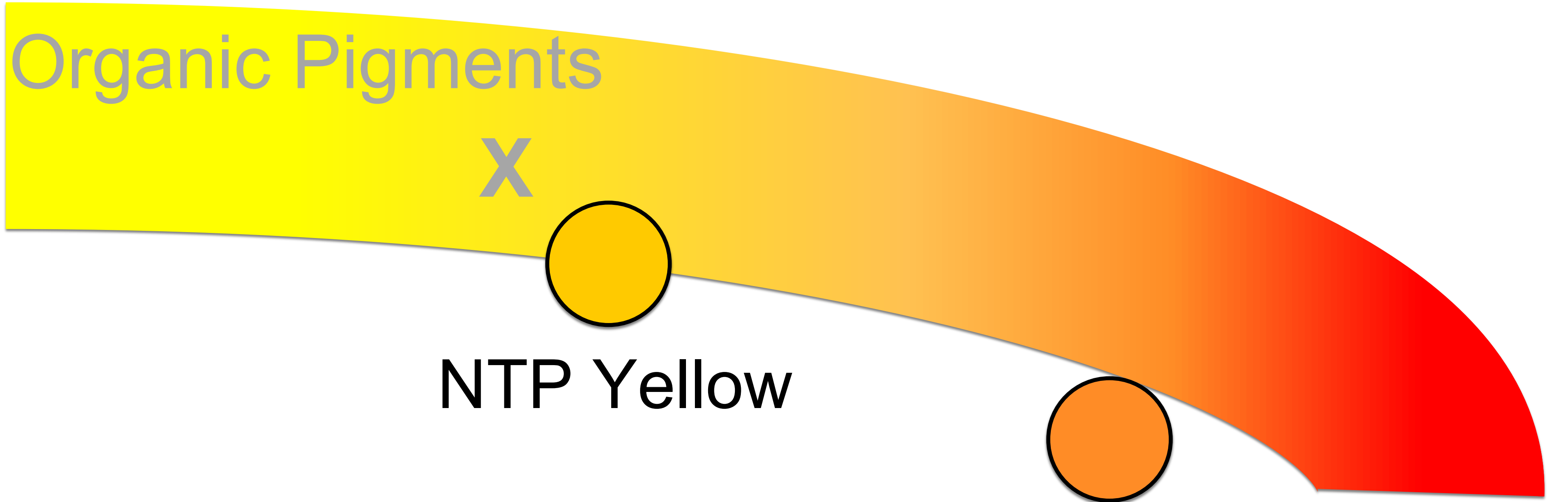
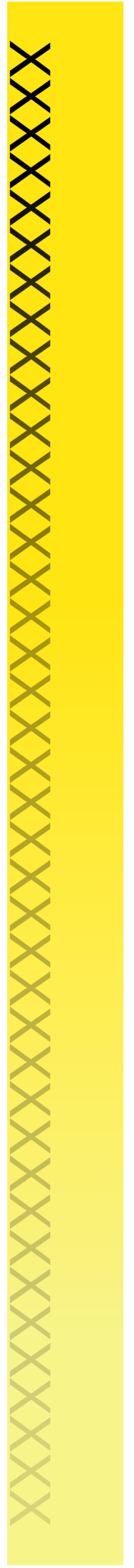
Opacity

Color space

More Chromatic (Brighter)

Chroma

Less Chromatic (Duller)



Yellow

Orange

Red

Opacity

Color space

Organic Pigments

Inorganic Pigments

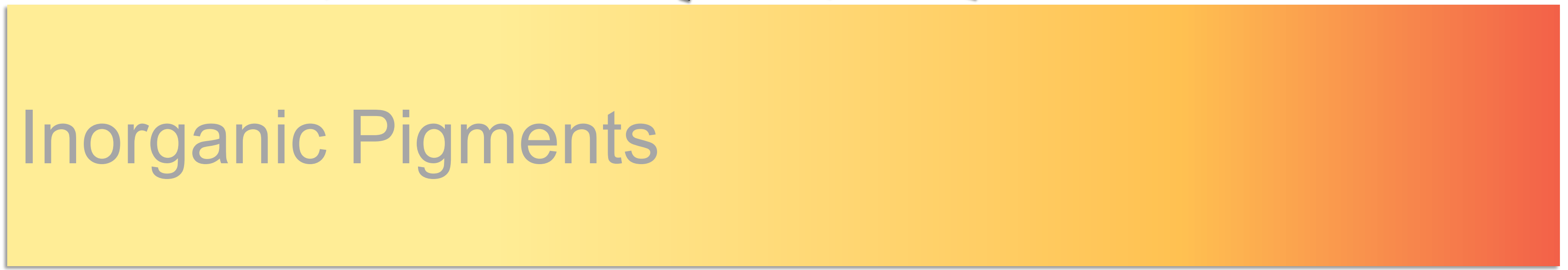
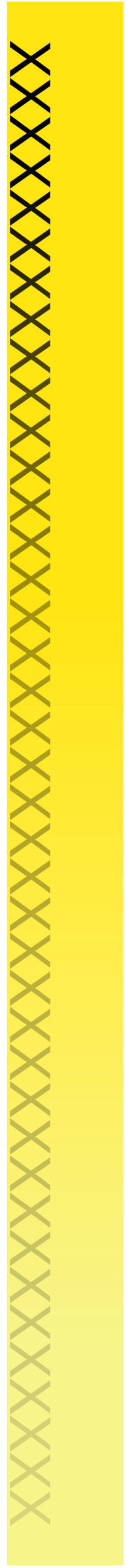
NTP Yellow

RTZ Orange

More Chromatic (Brighter)

Chroma

Less Chromatic (Duller)



NTP Yellow

RTZ Orange

Yellow

Orange

Red

Opacity

Color space





NO MORE
INCONSISTENCY



MORE
DURABILITY



MORE DURABILITY

With chemistry that can be applied to a wide range of materials, differential weathering is a thing of the past.

High Total Solar Reflectance

Excellent Chemical Resistance

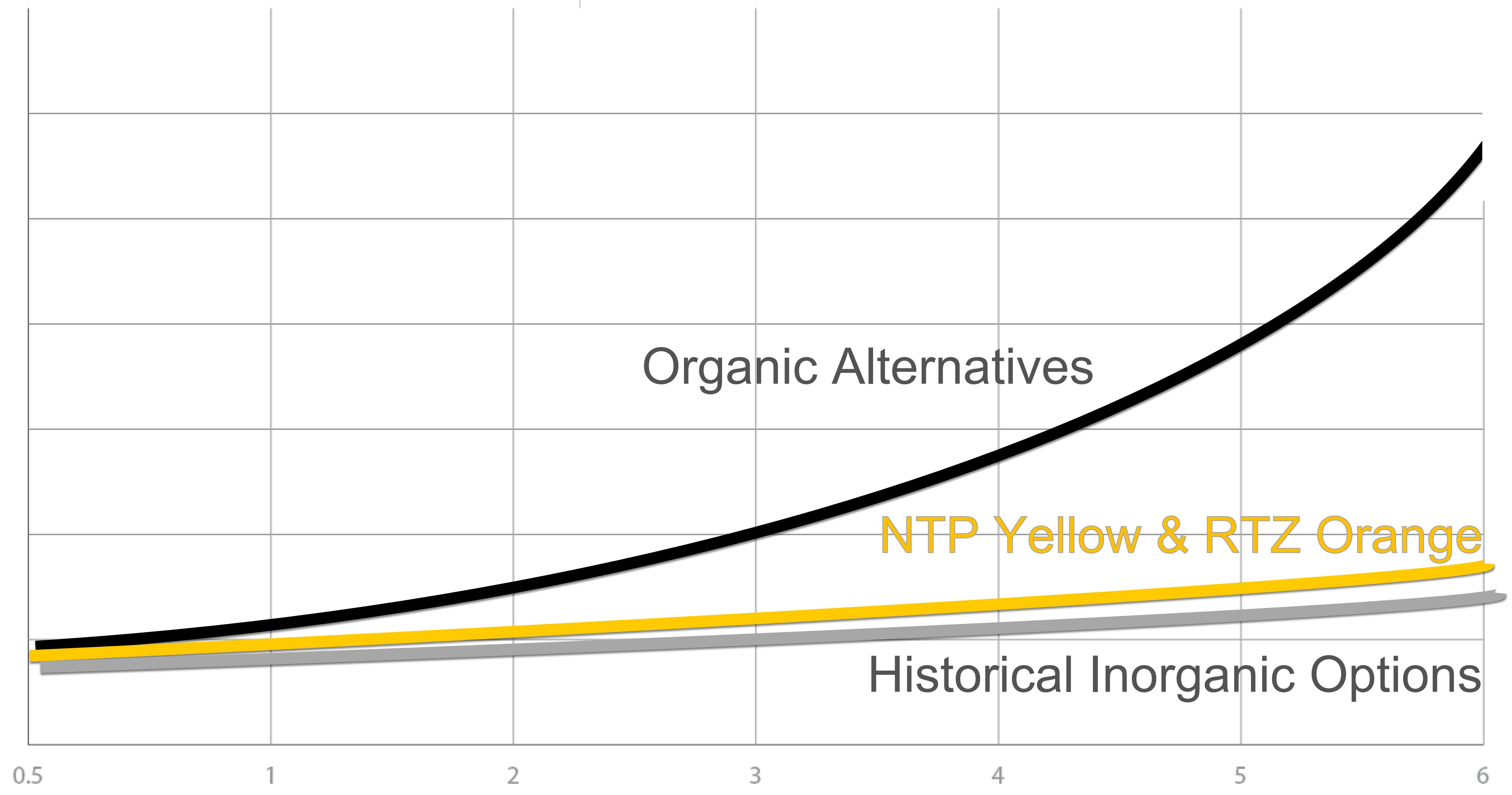
Excellent Weathering

High Heat Stability

MORE DURABILITY

Masstone South Florida Weathering

COLOR CHANGE



Organic Alternatives

NTP Yellow & RTZ Orange

Historical Inorganic Options

YEARS OF EXPOSURE





NO MORE
NONSENSE

MORE
RELIABLE





**MORE
RELIABLE**

Use less pigment, apply fewer coats and reduce waste with colors that are inherently higher performance.

Dynamix ED pigments

Engineering Polymers

Get the brand colors you need

Eliminate waste



NTP Yellow is bullet-proof.

Technical Manager, plastic masterbatch company

BETTER
COLORS

BETTER
DURABILITY

BETTER
RELIABILITY





APPLICATIONS

High-Heat Coatings

Coil Coatings

Silicate Coatings

Automotive Coatings

Powder Coatings



Engineering Plastics

High-Solar Reflectivity Systems

High-Durability Applications

Signage Applications

Corporate Colors

**Let's
dig
a little
deeper...**



NTP Yellow and RTZ Orange

CHROMATIC

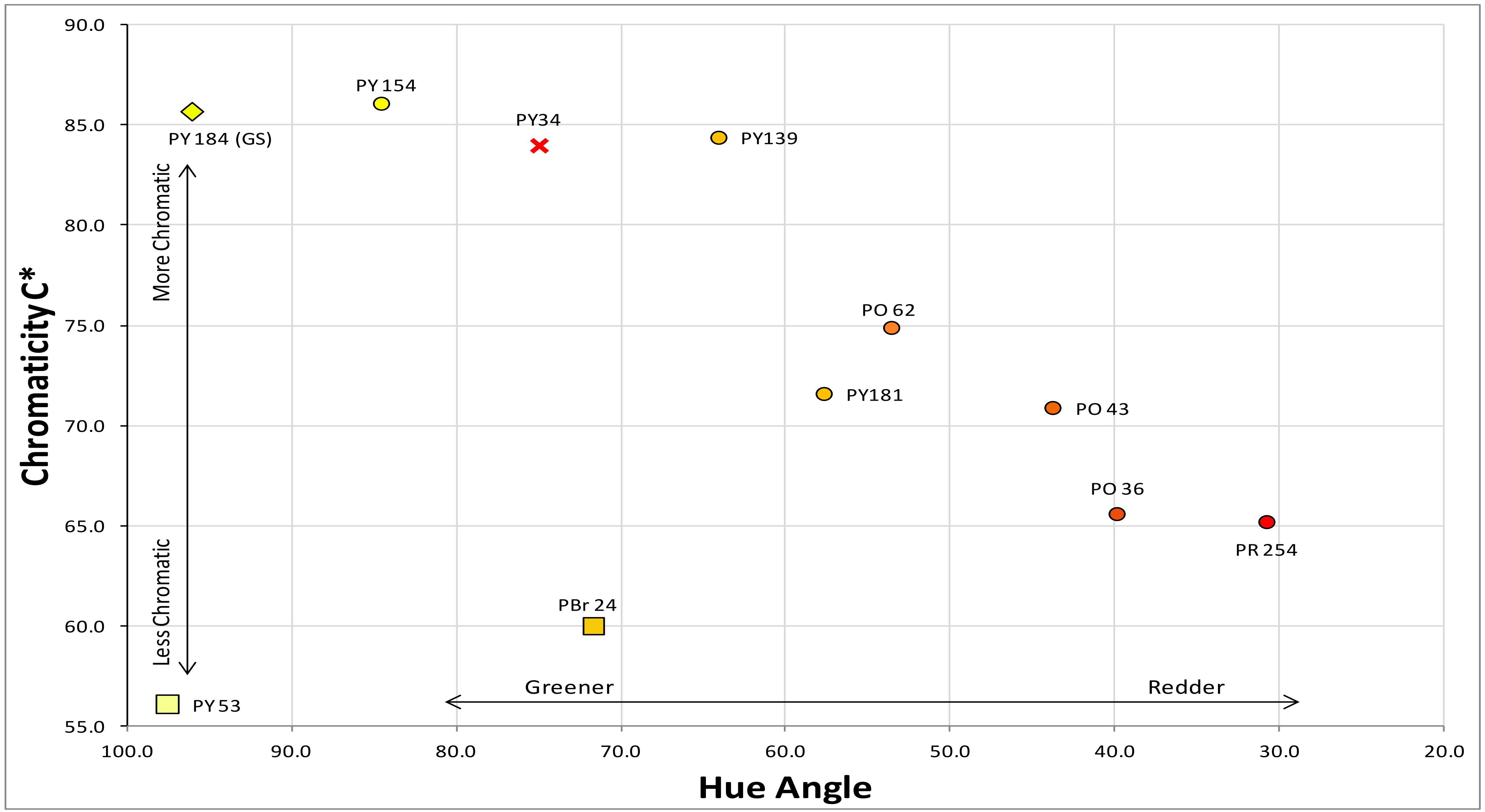


OPAQUE

DURABLE

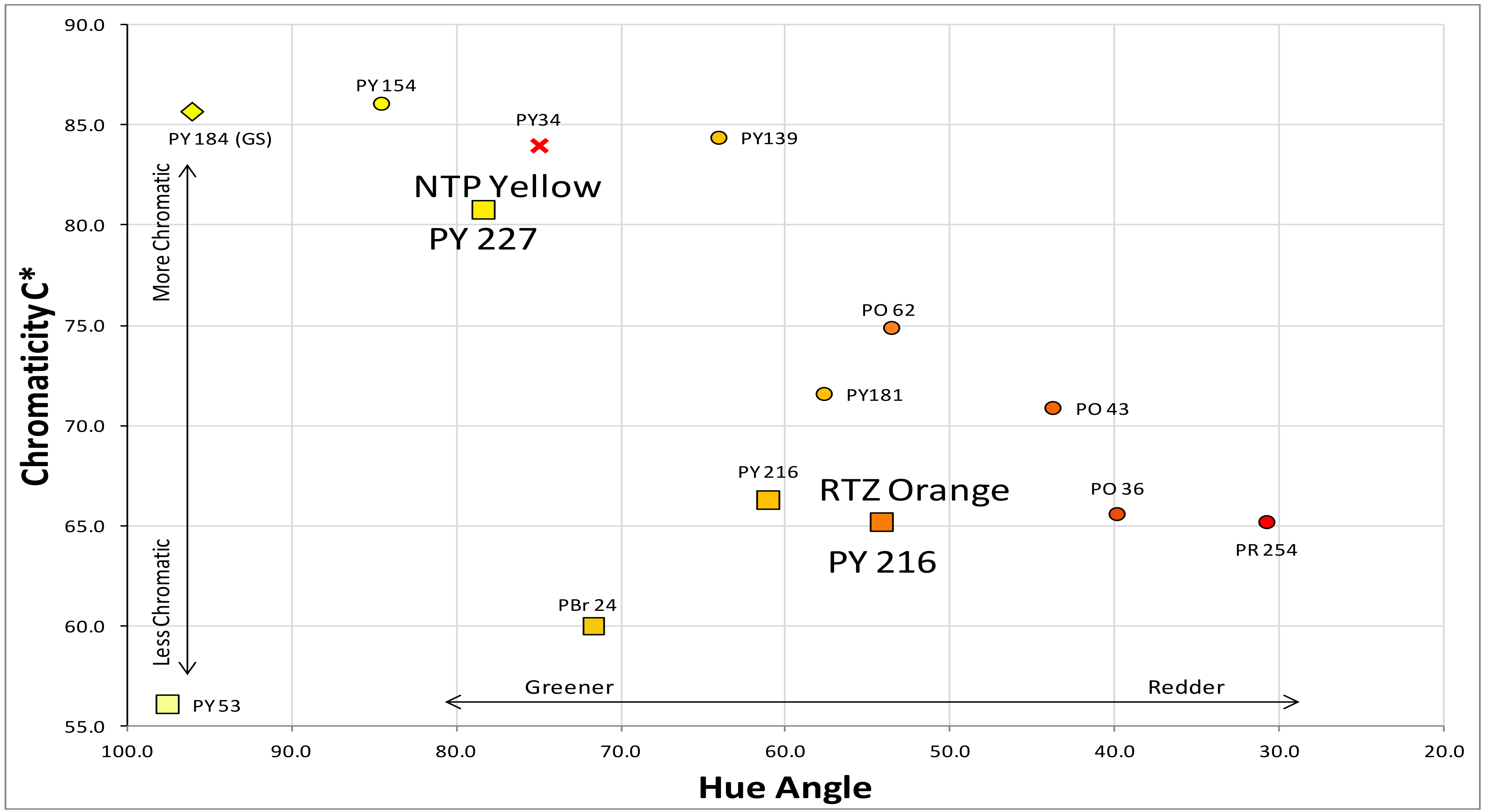


Chromaticity



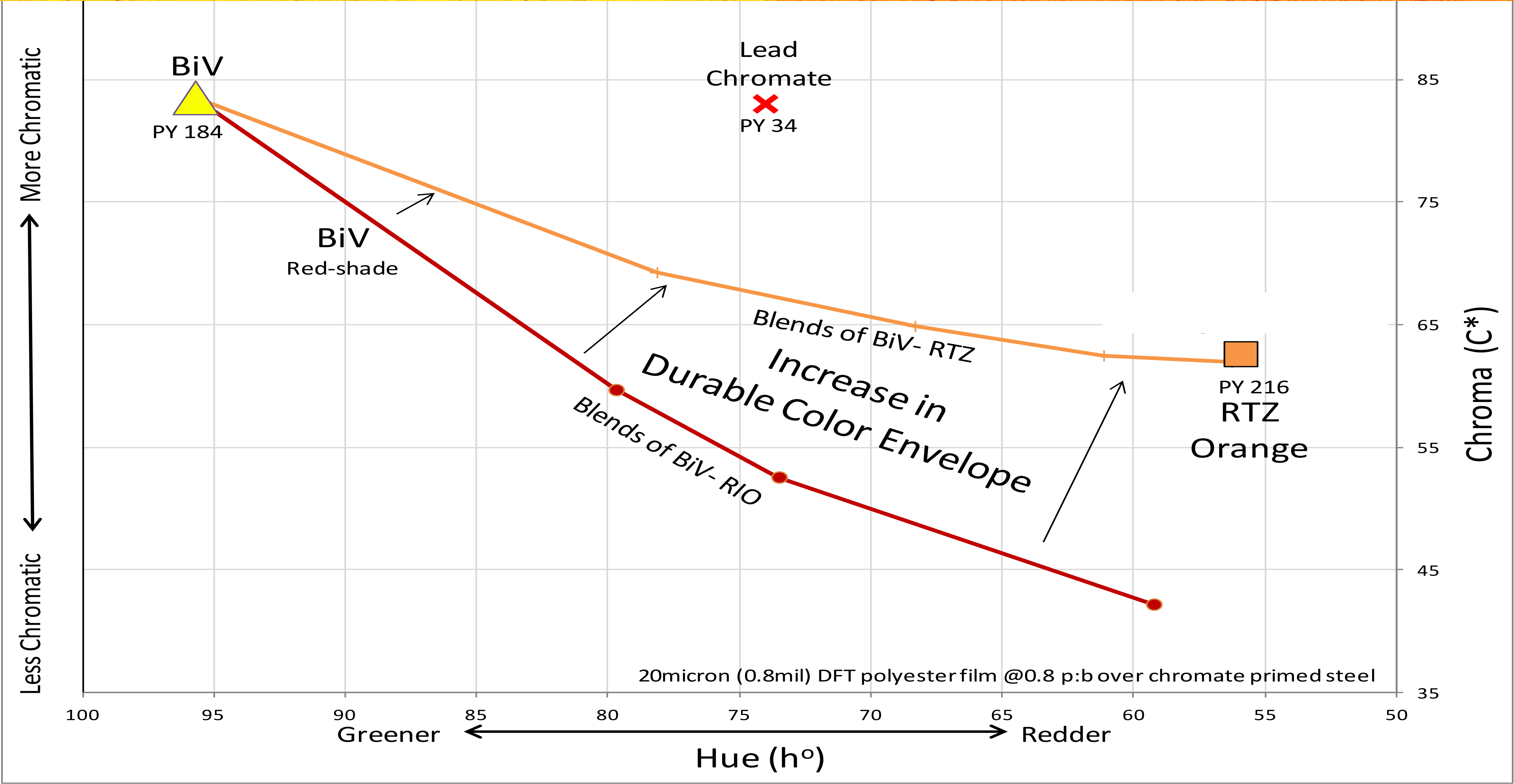


Chromaticity

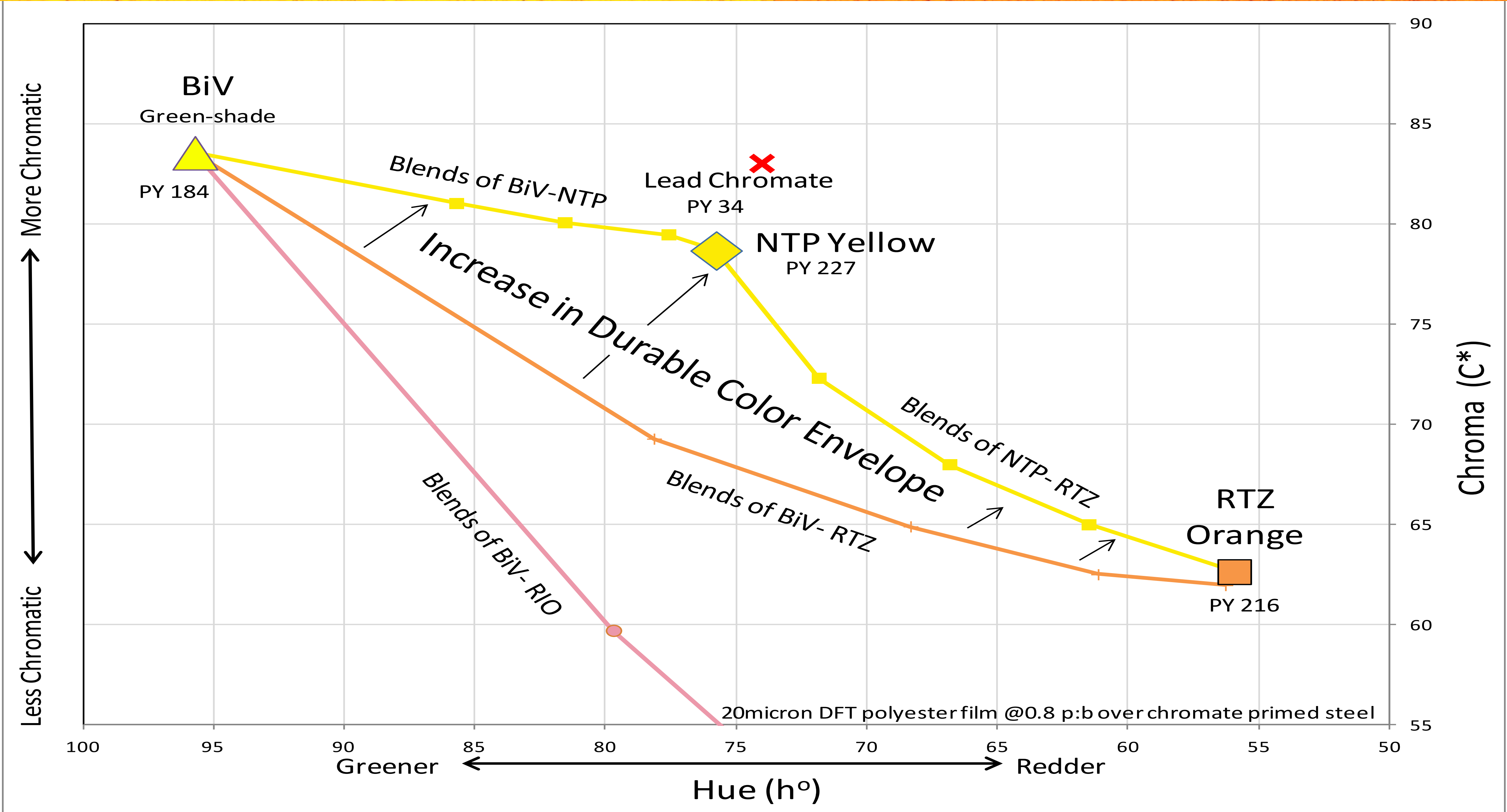




Chromaticity

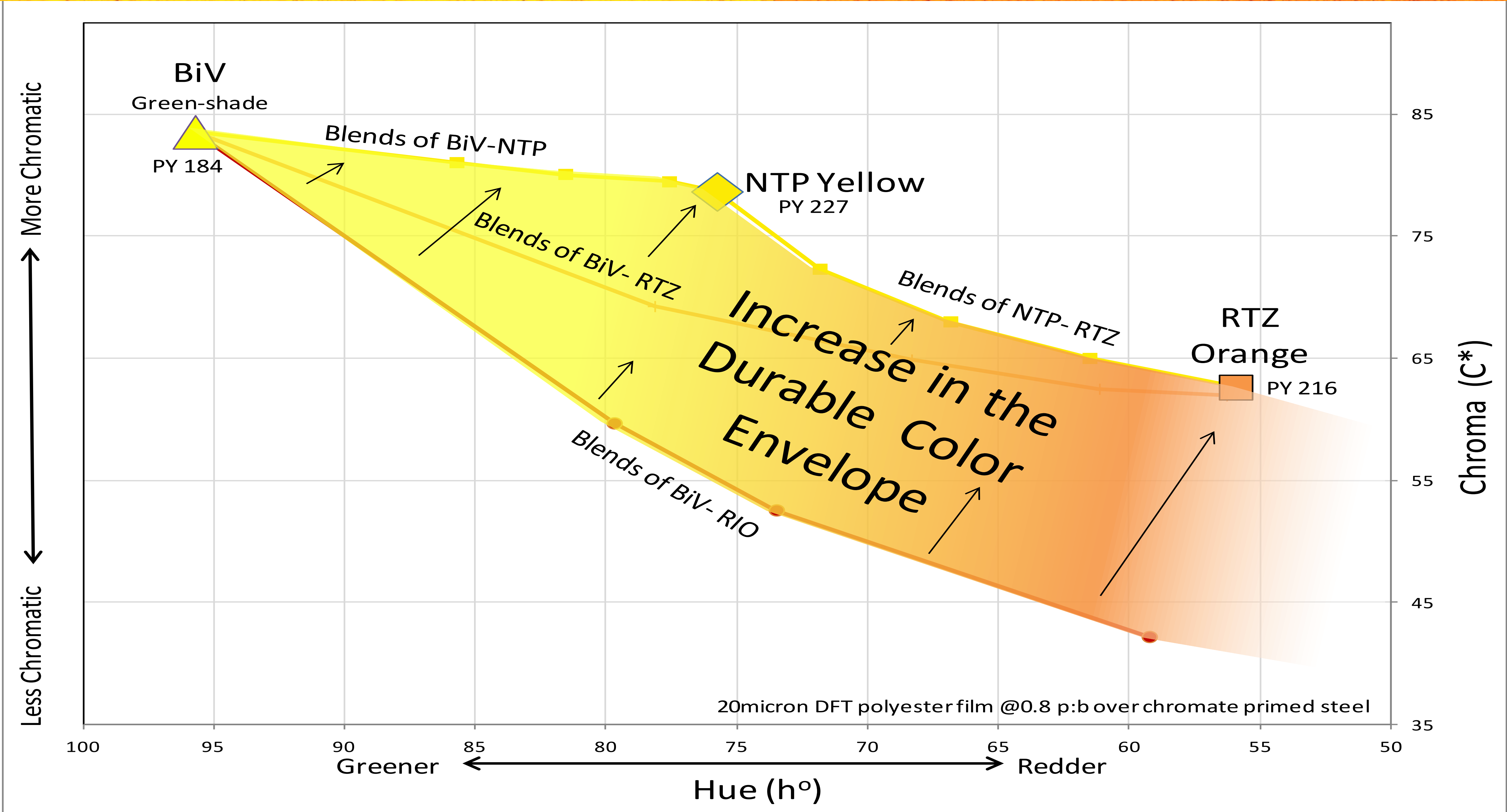


Chromaticity



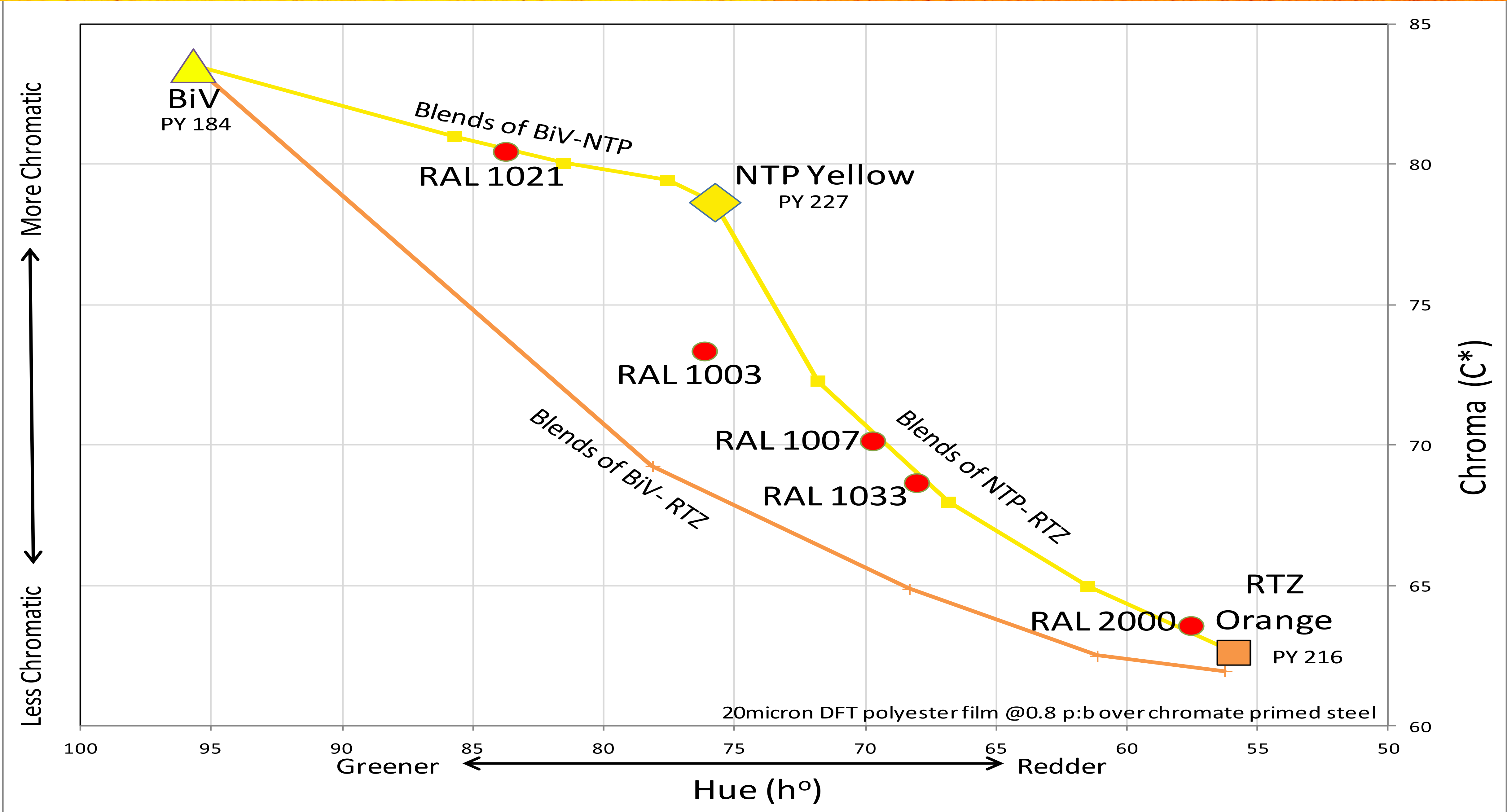


Chromaticity





Chromaticity



More Chromatic
↑
↓
Less Chromatic

Greener ←

→ Redder

Hue (h°)

Chroma (C*)

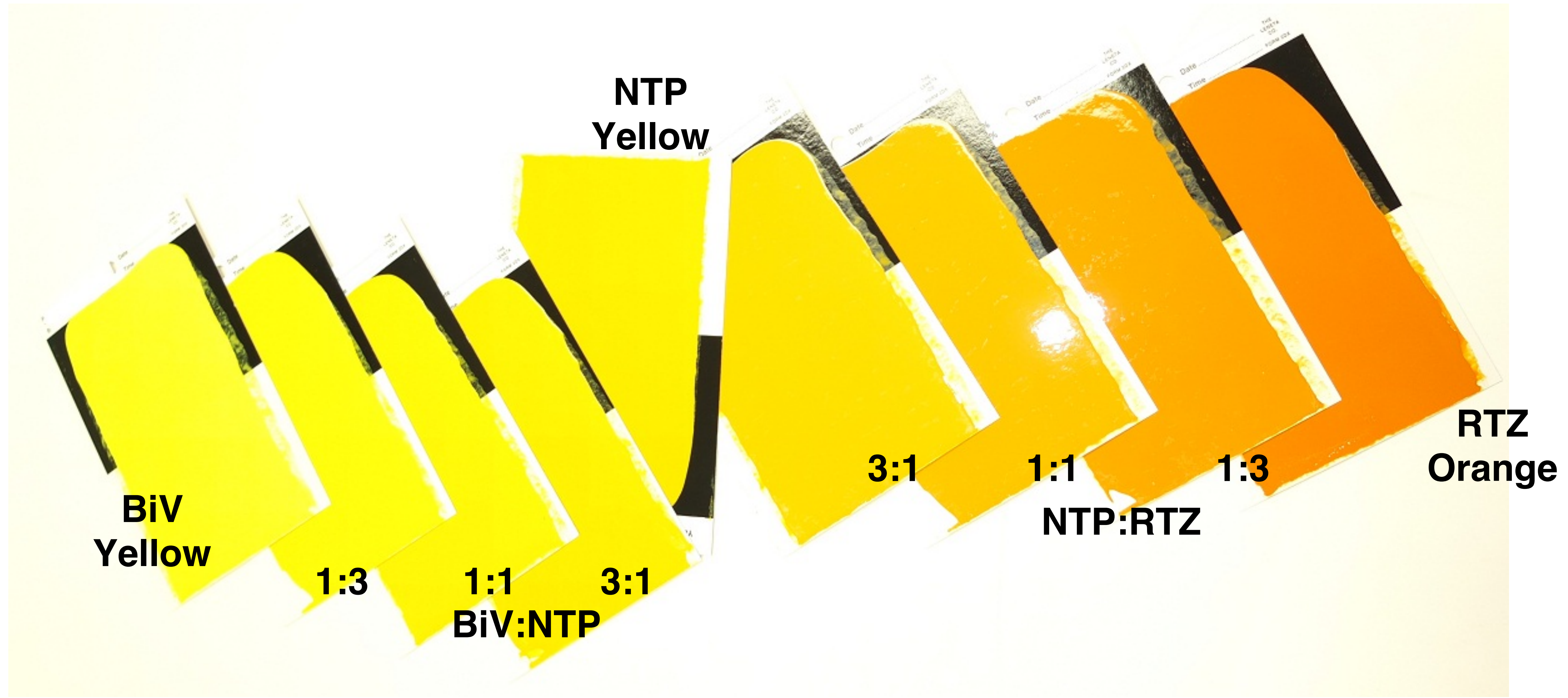
20micron DFT polyester film @0.8 p:b over chromate primed steel

NTP Yellow with RTZ Orange

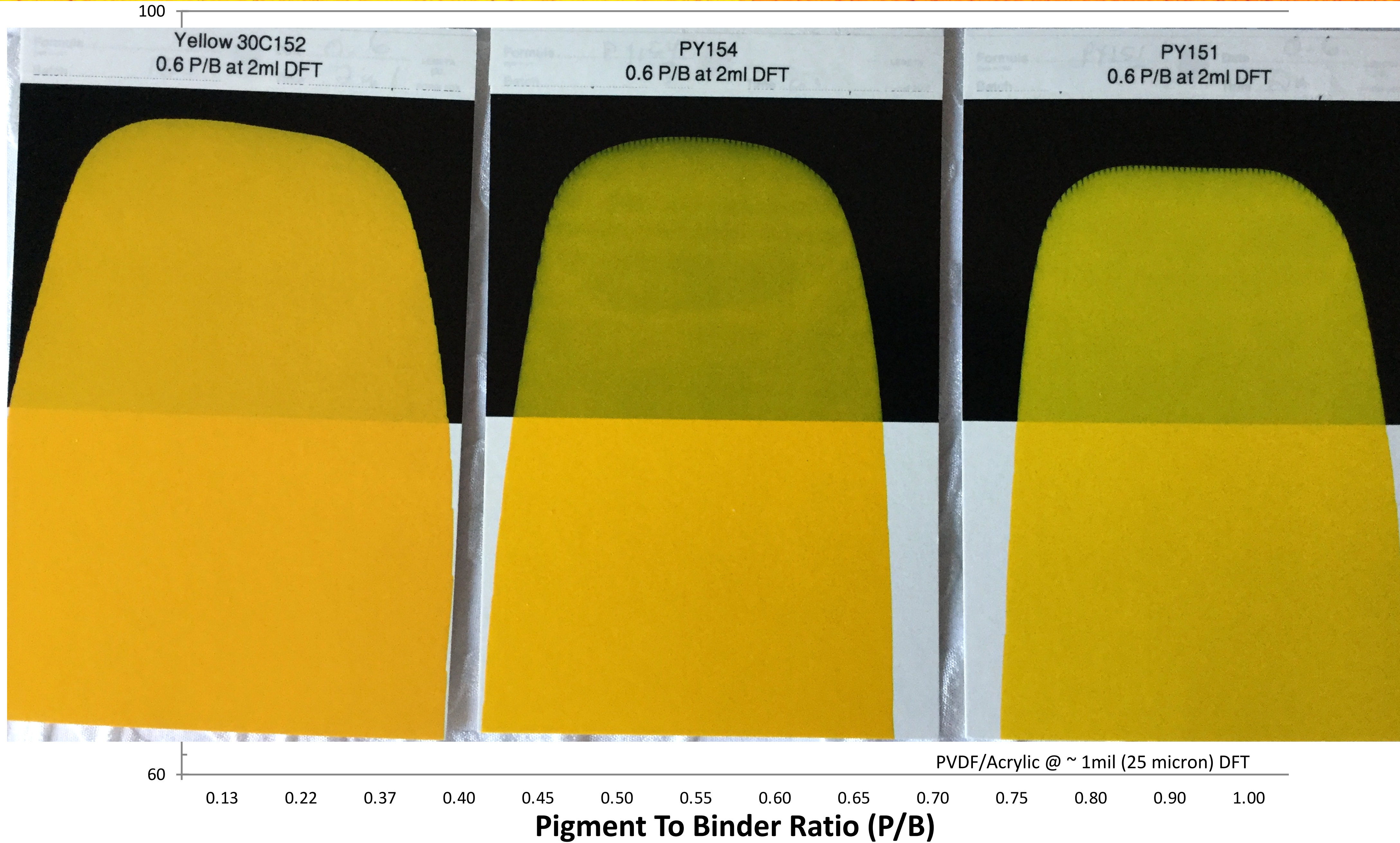


- Excellent range of red-shade yellow thru true orange
- Stable color to heat, acids, bases and weathering
- High opacity
- No deprecated metals
- **The color envelope frontier in environmentally friendly durable color**

BiV-NTP-RTZ Color Range



Opacity



Opacity



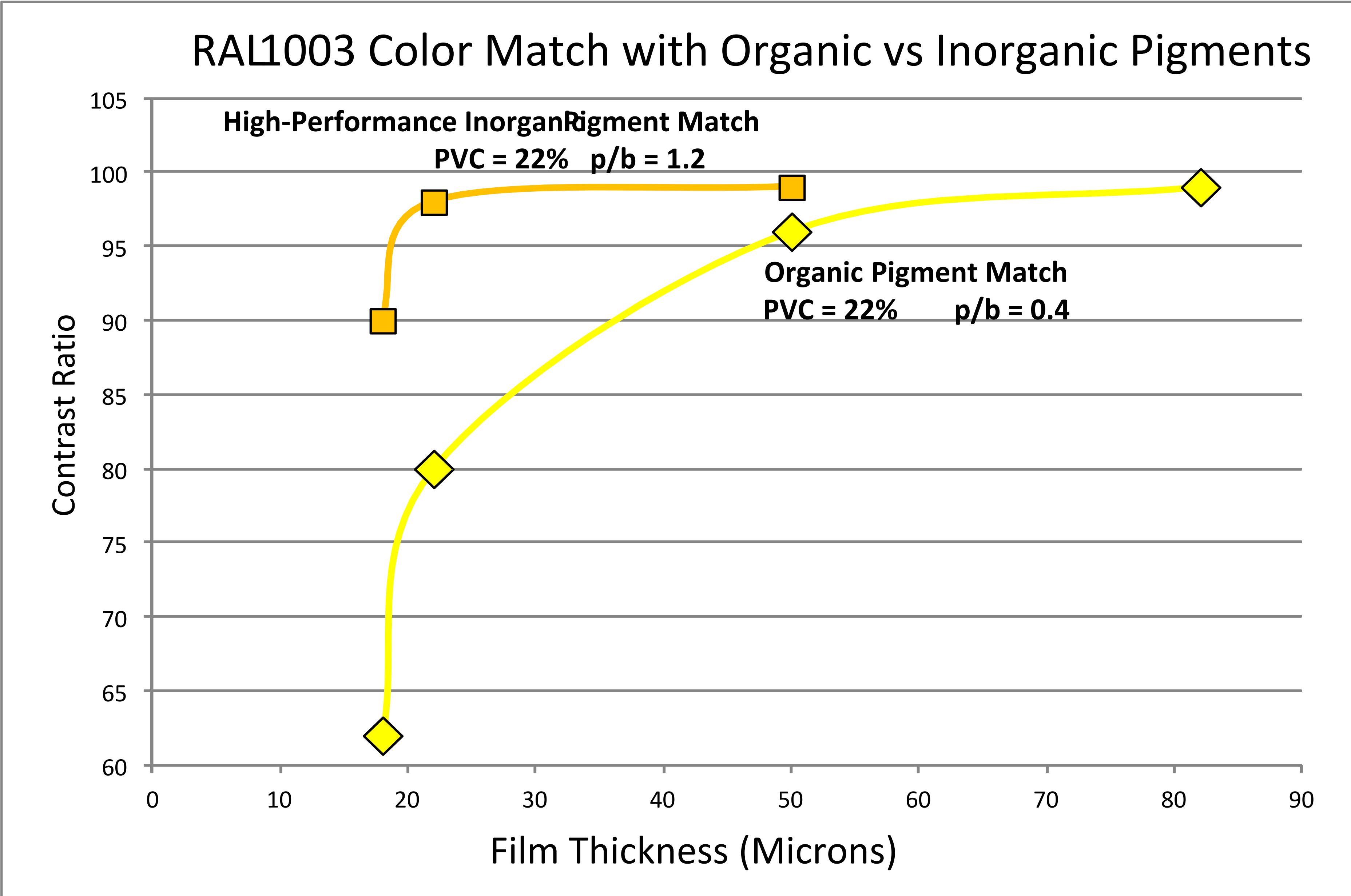
RAL 1003 Matches

Pigment	Chemistry	High Performance	BiV Based	Organic
P.Y. 154	Benzimidazolone			67.2
P.Y. 184	Bismuth Vanadate		67.0	
P.Y. 216	Rutile Tin Zinc	4.5		
P.Br. 24	Chromium Titanate	23.0	22.0	
NTP Yellow	Niobium Tin Pyrochlore	72.5		
P.Y.139	Isoindoline		8.0	
P.O. 62	Benzimidazolone			10.2
P.Bk. 7	Carbon Black			0.1
P.W. 6	Titanium Dioxide			22.5

	5000 Hours QUV in PMMA Plaque			
	dL	da	db	dE
NTP Based	-0.7	-1.5	-1.9	2.5
Organic Pigments	-1.0	-2.0	-4.0	4.6
BV+Organics	-0.7	-2.3	-3.1	3.9

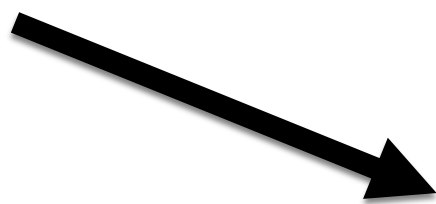


Opacity



Opacity

Material		Pigment Formula	
		NTP Based	Organic Based
P.Y. 154	Benzimidazolone		55%
P.Y. 181	Mono Azo		11%
P.Y. 53	Nickel Titanate	24%	
P.Br. 24	Chromium Titanate	10%	
P.Y.227	Niobium Tin Pyrochlore	66%	
P.W. 6	Titanium Dioxide		34%
		100%	100%



- Lower overall material usage
- Simpler application

Cost-to-Opacity

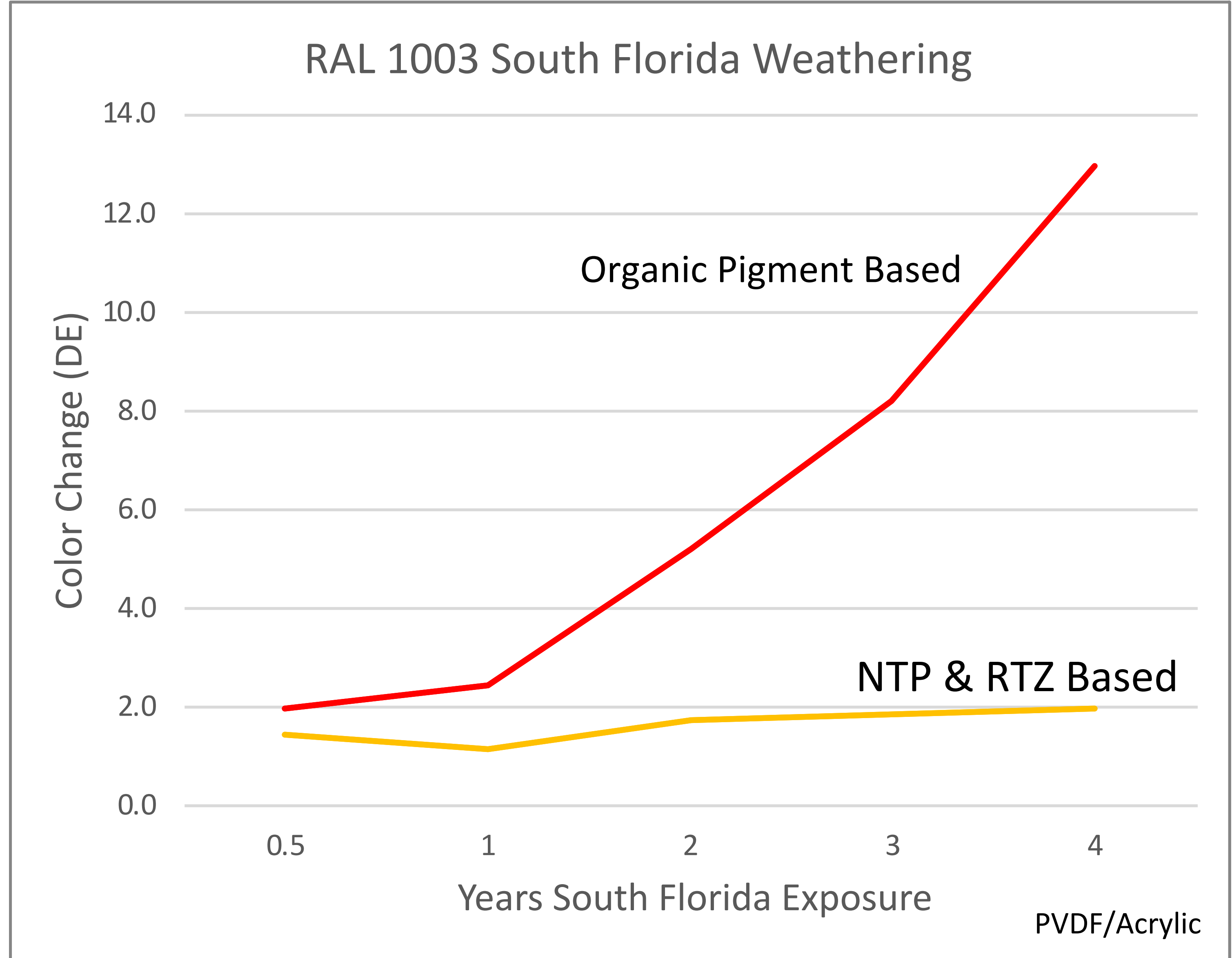
- Greater inherent opacity
- Higher pigment loading

	Costs	NTP Based	Organic Based
	DFT Required (microns)	22	46
	Cost	194.76	311.16
Relative Cost Ratio		1.0	1.6



Durability

PVDF/Acrylic Masstone		Years of Exposure					
		0.5	1	2	3	4	
RAL 1003 Match	Inorganic	ΔL^*	-0.6	-0.4	-0.2	-0.1	-0.3
		Δa^*	0.0	0.2	0.2	0.1	0.1
		Δb^*	-1.4	-1.1	-1.7	-1.9	-2.0
		ΔE^*	1.5	1.2	1.8	1.9	2.0
		ΔG^*	2.0	1.5	-1.5	-6.0	-13.0
RAL 1003 Match	Organic	ΔL^*	-0.5	0.1	0.9	1.5	1.6
		Δa^*	-0.7	-1.5	-3.0	-4.1	-4.8
		Δb^*	-1.8	-2.0	-4.1	-7.0	-11.9
		ΔE^*	2.0	2.5	5.2	8.2	12.9
		ΔG^*	4.0	2.5	-3.0	-7.5	-14.5





Durability

RTZ

PVDF/Acrylic

PY21

PY216-

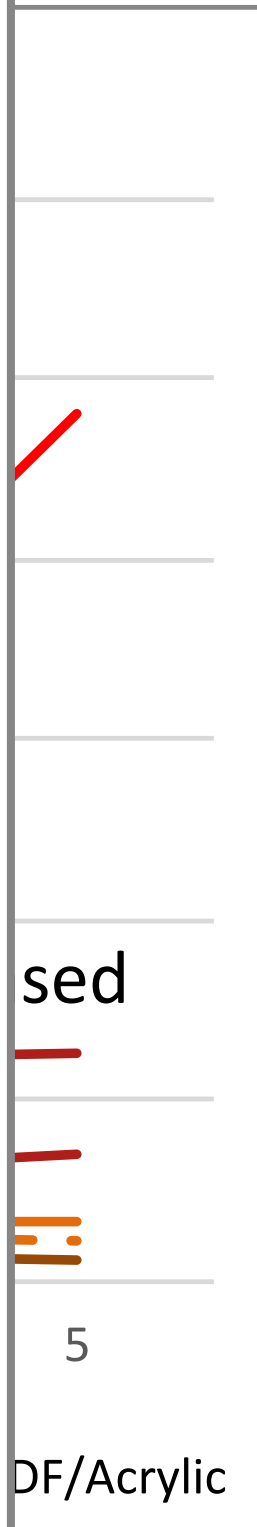
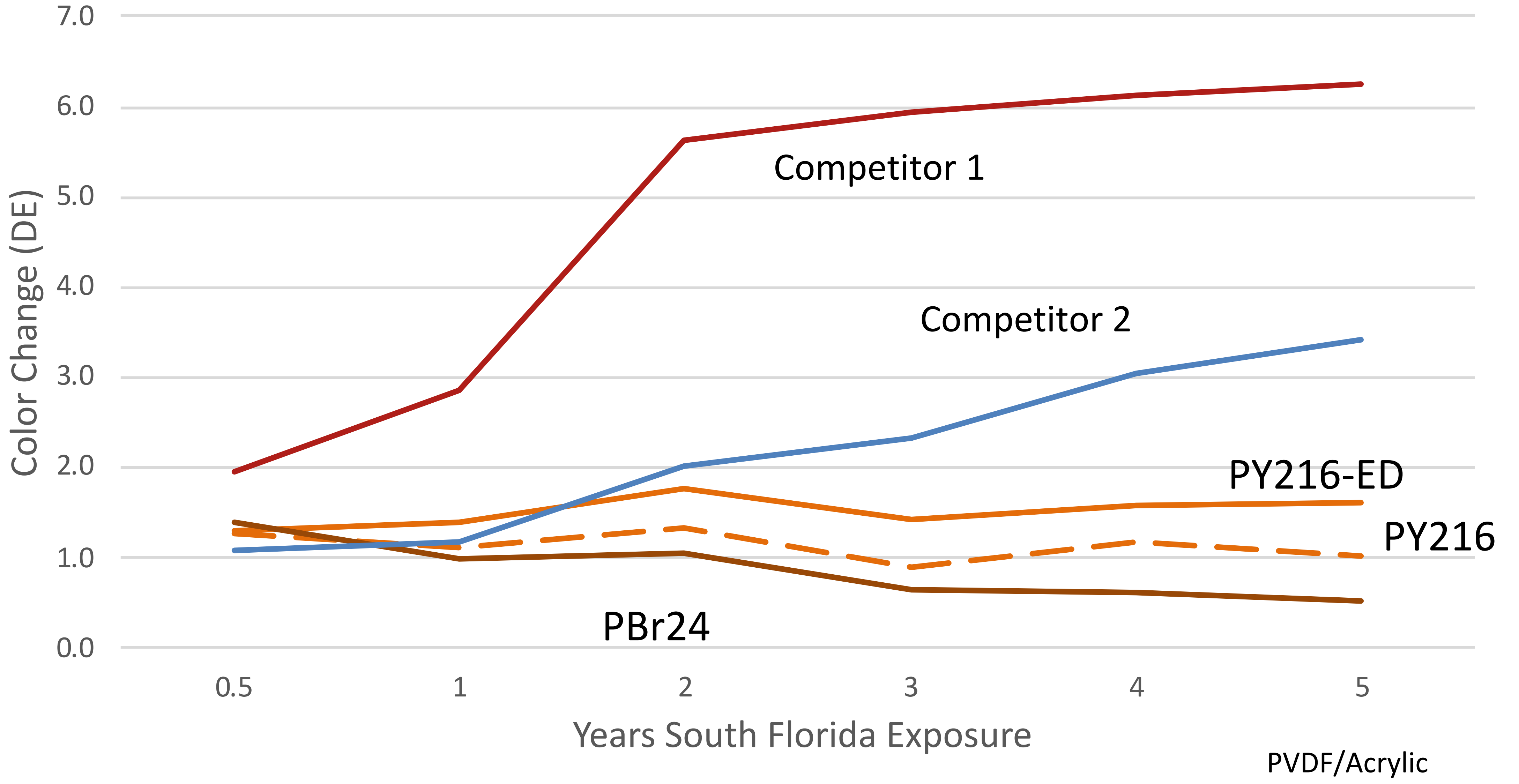
PBr24

CI Pigment

Competit

Competit

Masstone South Florida Weathering



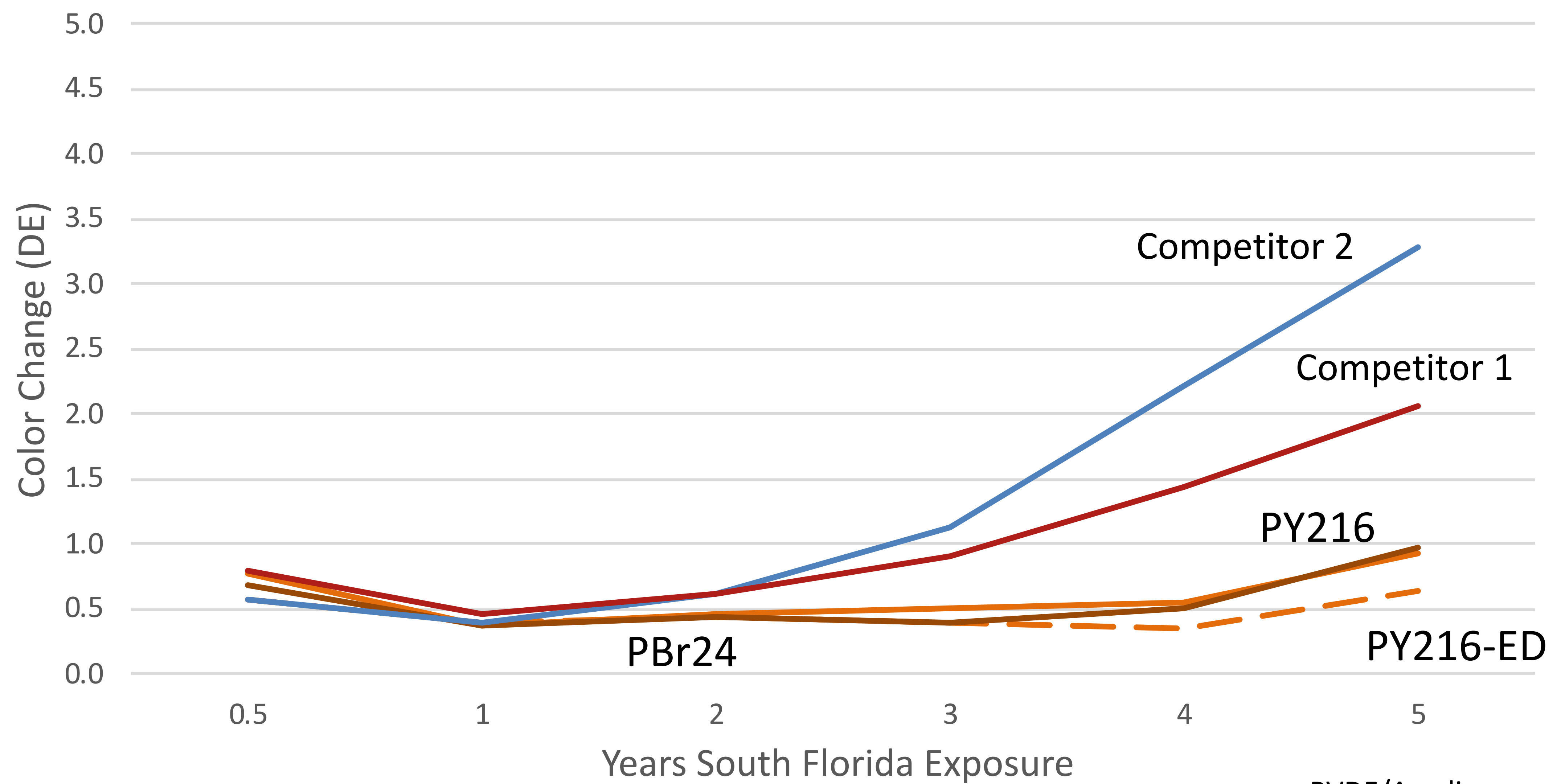


Durability

RTZ

PVDF/Acrylic
PY216
PY216-ED
PBr24
CI Pigment Yellow
Competitor
Competitor

4:1 Tint South Florida Weathering

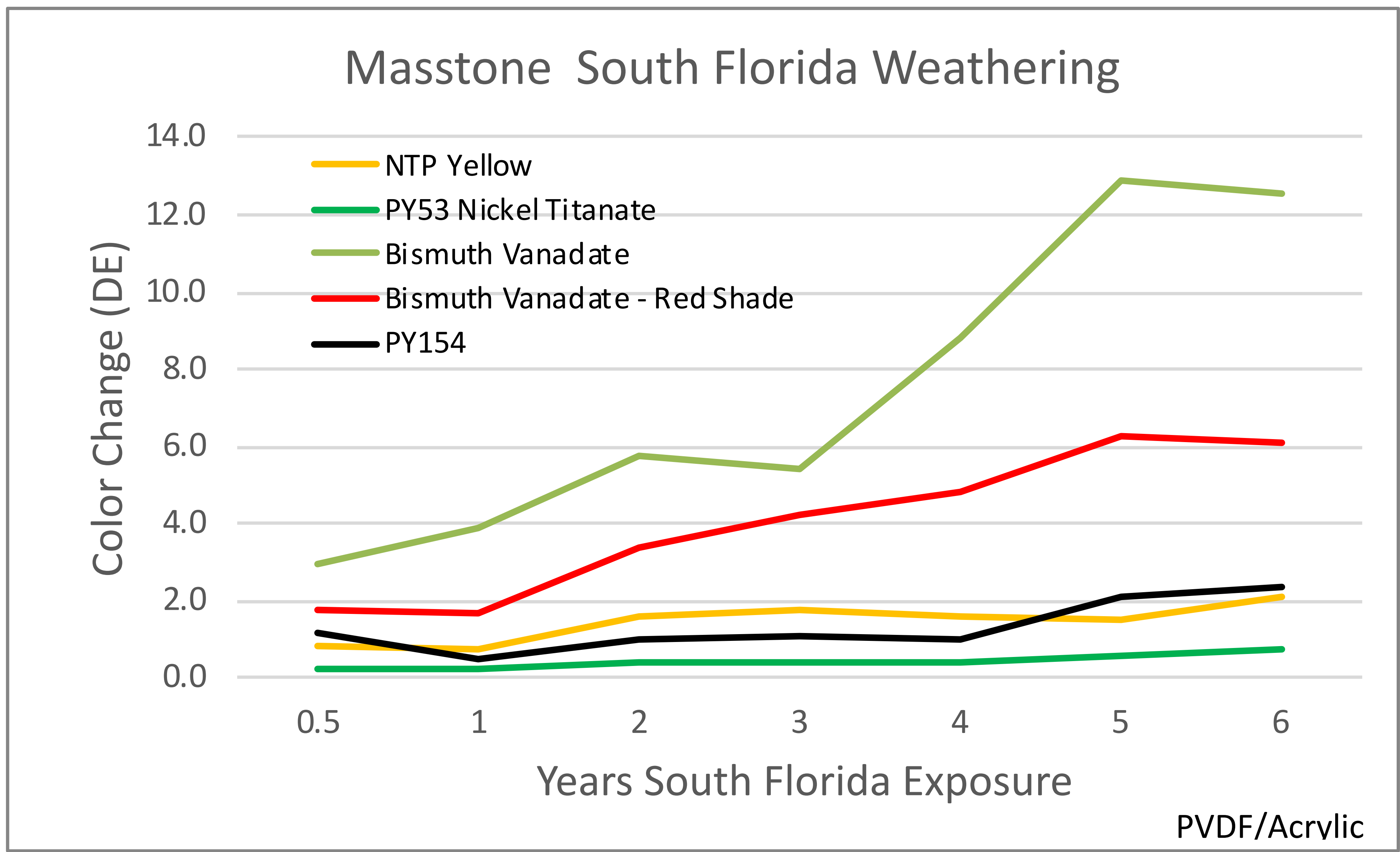


Based
d
5
/DF/Acrylic



Durability

NTP Yellow Weathering

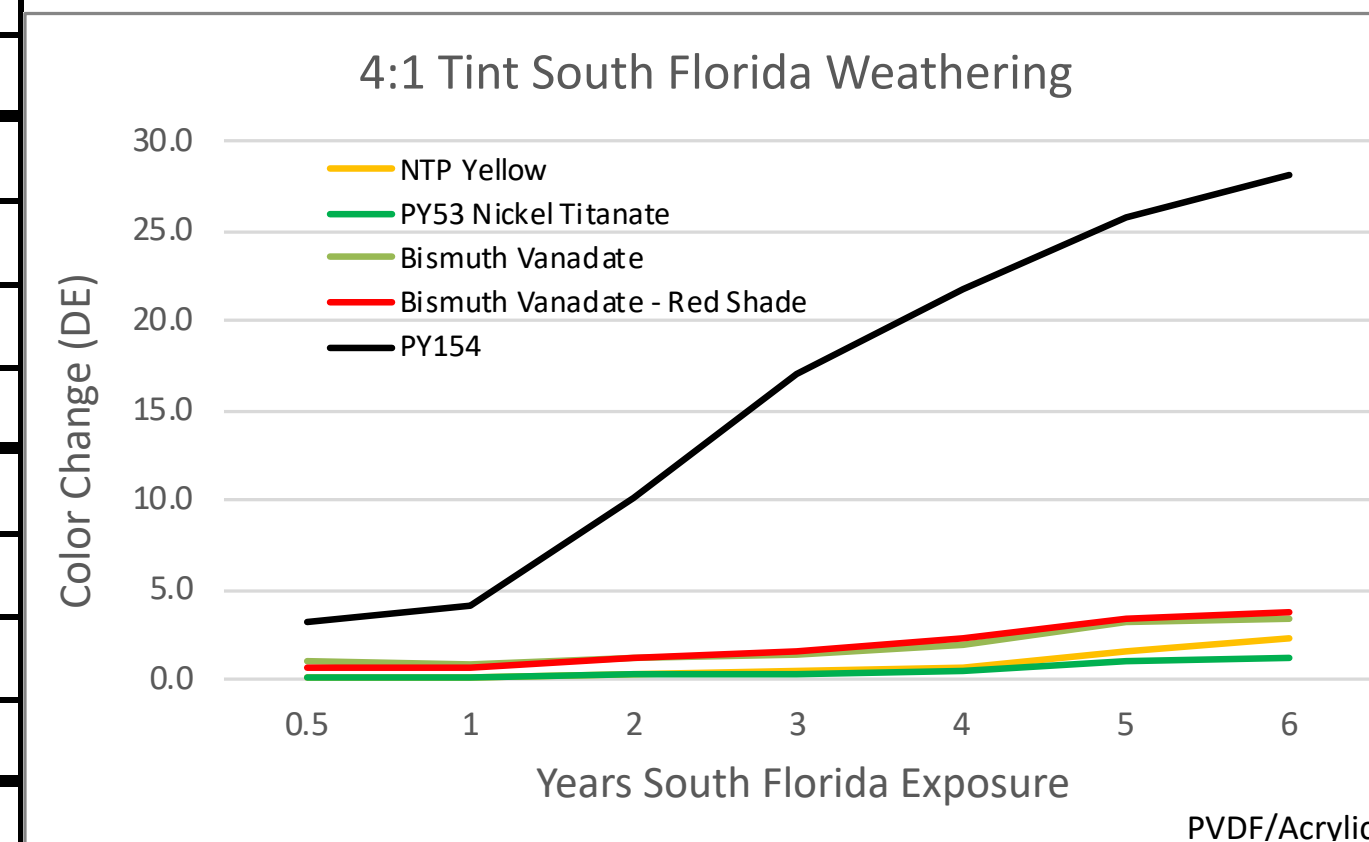


NTP Yellow Weathering

PVDF/Acrylic Masstone	Initial Color Values	Years of Exposure								
		0.5	1	2	3	4	5	6		
NTP Yellow	L*	77.6	ΔL^*	0.0	0.0	-0.2	-0.1	-0.2	-0.2	-0.3
	a*	18.9	Δa^*	0.1	0.4	0.5	0.6	0.7	0.5	1.2
	b*	79.4	Δb^*	-0.8	-0.6	-1.5	-1.7	-1.4	-1.4	-1.7
			ΔE^*	0.8	0.7	1.6	1.8	1.6	1.5	2.1
PY53 Nickel Titanate	L*	86.0	ΔL^*	0.0	0.1	0.1	0.2	0.2	0.0	0.1
	a*	-7.6	Δa^*	0.2	0.2	0.3	0.4	0.4	0.5	0.7
	b*	57.1	Δb^*	-0.2	0.1	-0.1	-0.1	0.1	-0.3	-0.1
			ΔE^*	0.3	0.3	0.4	0.4	0.5	0.6	0.7
PY53 ED 19	L*	86.7	ΔL^*	0.0	0.1	0.1	0.1	0.2	0.0	0.2
	a*	-7.4	Δa^*	0.0	0.0	0.1	0.2	0.2	0.3	0.5
	b*	52.7	Δb^*	-0.2	0.0	-0.1	-0.1	0.1	-0.2	0.2
			ΔE^*	0.3	0.3	0.3	0.3	0.3	0.4	0.6
Bismuth Vanadate	L*	87.6	ΔL^*	-0.6	-1.0	-1.8	-1.4	-3.0	-4.9	-4.6
	a*	-8.9	Δa^*	1.9	2.8	3.9	3.7	6.3	8.8	9.2
	b*	86.6	Δb^*	-2.2	-2.6	-3.9	-3.8	-5.3	-8.0	-7.2
			ΔE^*	3.0	3.9	5.8	5.4	8.8	12.9	12.5
Bismuth Vanadate - Red Shade	L*	75.6	ΔL^*	-0.2	-0.3	-0.4	0.1	-0.1	-0.1	0.2
	a*	20.3	Δa^*	-0.1	-0.3	-1.2	-2.3	-2.6	-3.8	-3.8
	b*	72.8	Δb^*	-1.7	-1.7	-3.1	-3.6	-4.1	-5.1	-4.7
			ΔE^*	1.8	1.7	3.4	4.2	4.8	6.3	6.1
PY154	L*	70.6	ΔL^*	-0.3	-0.2	-0.5	-0.6	-0.6	-0.8	-1.0
	a*	-2.4	Δa^*	-0.3	-0.2	-0.2	-0.4	-0.4	-0.7	-0.2
	b*	72.4	Δb^*	-1.1	-0.4	-0.8	-0.9	-0.7	-1.8	-2.2
			ΔE^*	1.2	0.5	1.0	1.1	1.0	2.1	2.4

NTP Yellow Weathering

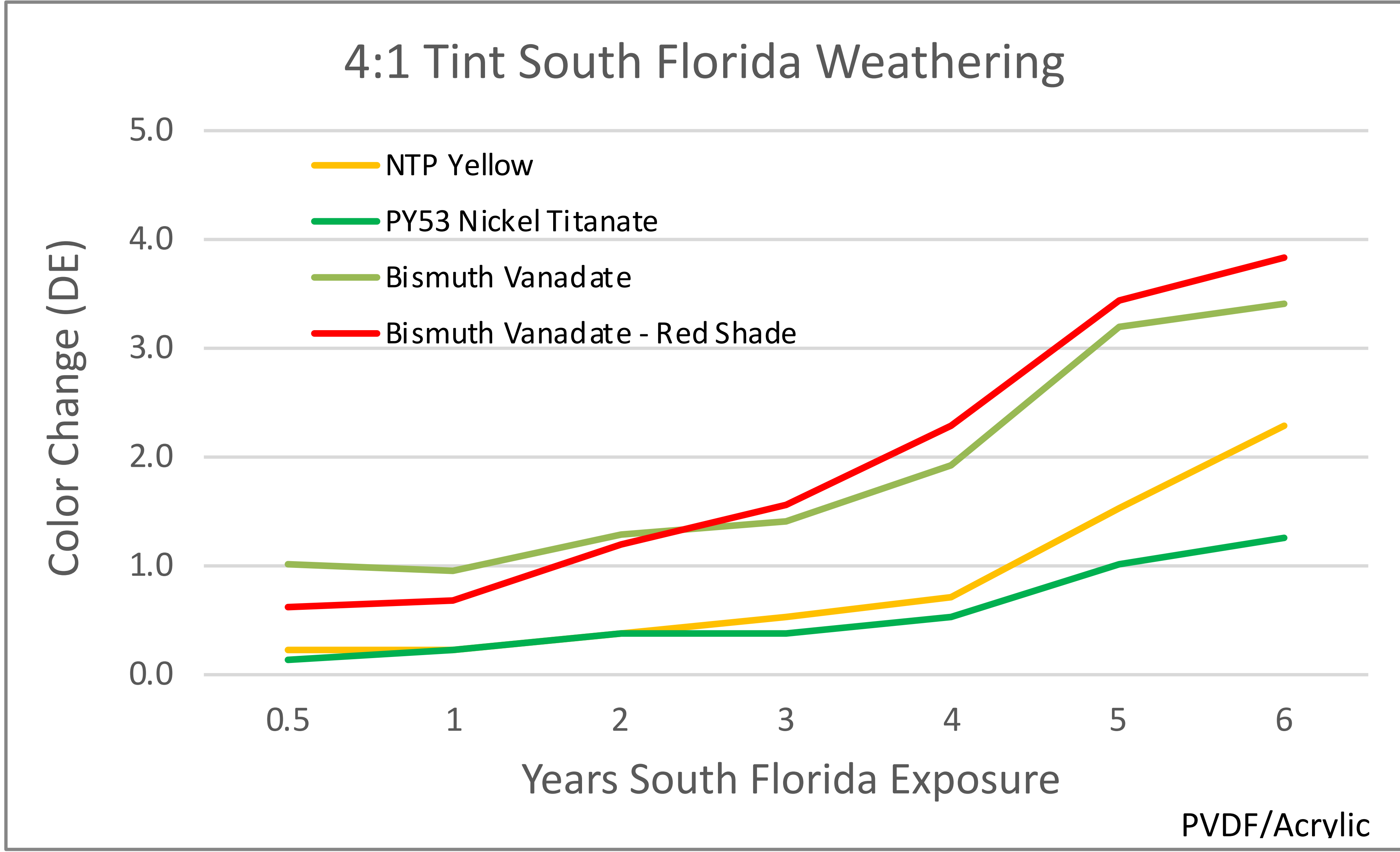
PVDF/Acrylic 4:1 Tint	Initial Color Values		Years of Exposure							
			0.5	1	2	3	4	5	6	
NTP Yellow	L*	77.6	ΔL^*	-0.2	0.1	0.0	0.0	0.3	-0.1	0.2
	a*	18.9	Δa^*	0.1	0.2	0.4	0.5	0.6	0.2	0.7
	b*	79.4	Δb^*	-0.2	0.0	-0.1	-0.2	-0.4	-1.5	-2.2
			ΔE^*	0.2	0.3	0.4	0.6	0.7	1.6	2.3
PY53 Nickel Titanate	L*	86.0	ΔL^*	-0.1	0.1	-0.1	0.1	0.2	-0.2	0.3
	a*	-7.6	Δa^*	0.1	0.2	0.3	0.3	0.4	0.7	0.8
	b*	57.1	Δb^*	0.0	0.0	0.2	0.1	-0.3	-0.7	-1.0
			ΔE^*	0.2	0.2	0.4	0.4	0.6	1.0	1.3
PY53 ED	L*	86.7	ΔL^*	-0.1	0.3	0.0	0.1	0.2	0.0	0.3
	a*	-7.4	Δa^*	0.1	0.1	0.2	0.2	0.3	0.6	0.6
	b*	52.7	Δb^*	0.0	0.0	0.2	0.2	-0.1	-0.5	-0.7
			ΔE^*	0.2	0.3	0.3	0.4	0.4	0.8	1.0
Bismuth Vanadate	L*	87.6	ΔL^*	-0.4	-0.1	-0.2	-0.2	-0.2	-0.4	-0.2
	a*	-8.9	Δa^*	0.6	0.7	1.0	1.0	1.3	1.9	2.0
	b*	86.6	Δb^*	-0.7	-0.6	-0.8	-1.0	-1.4	-2.6	-2.8
			ΔE^*	1.0	1.0	1.3	1.4	1.9	3.2	3.4
Bismuth Vanadate - Red Shade	L*	75.6	ΔL^*	-0.3	0.1	-0.1	0.0	0.2	0.1	0.4
	a*	20.3	Δa^*	-0.1	-0.1	-0.3	-0.4	-0.6	-0.7	-0.5
	b*	72.8	Δb^*	-0.6	-0.7	-1.2	-1.5	-2.2	-3.4	-3.8
			ΔE^*	0.6	0.7	1.2	1.6	2.3	3.5	3.9
PY154	L*	70.6	ΔL^*	-0.1	0.3	0.6	1.1	1.4	1.5	1.9
	a*	-2.4	Δa^*	0.3	0.3	0.5	1.1	1.5	1.8	2.2
	b*	72.4	Δb^*	-3.3	-4.1	-10.1	-17.0	-21.7	-25.7	-28.0
			ΔE^*	3.3	4.1	10.1	17.1	21.8	25.8	28.1





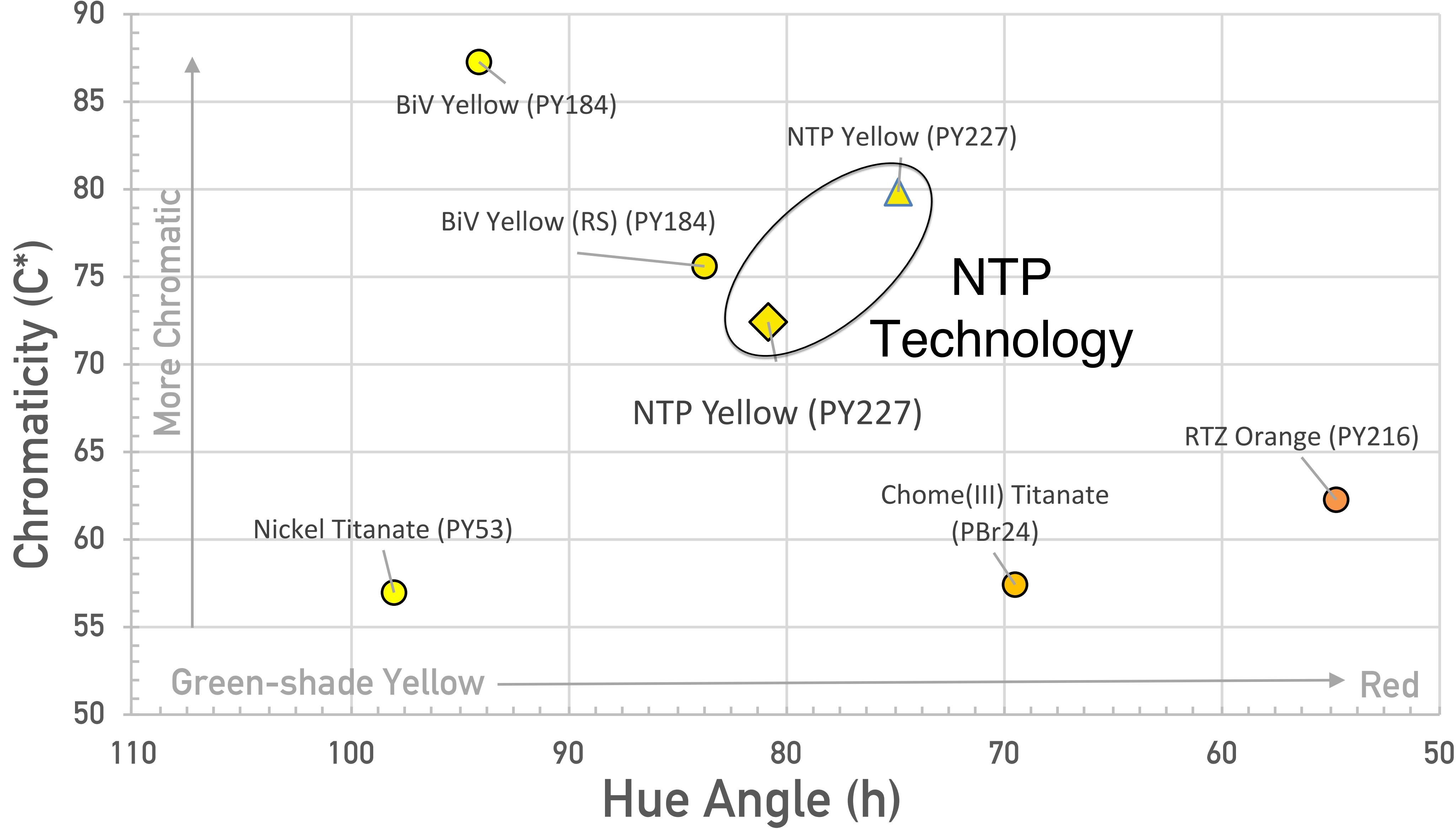
Durability

NTP Yellow Weathering



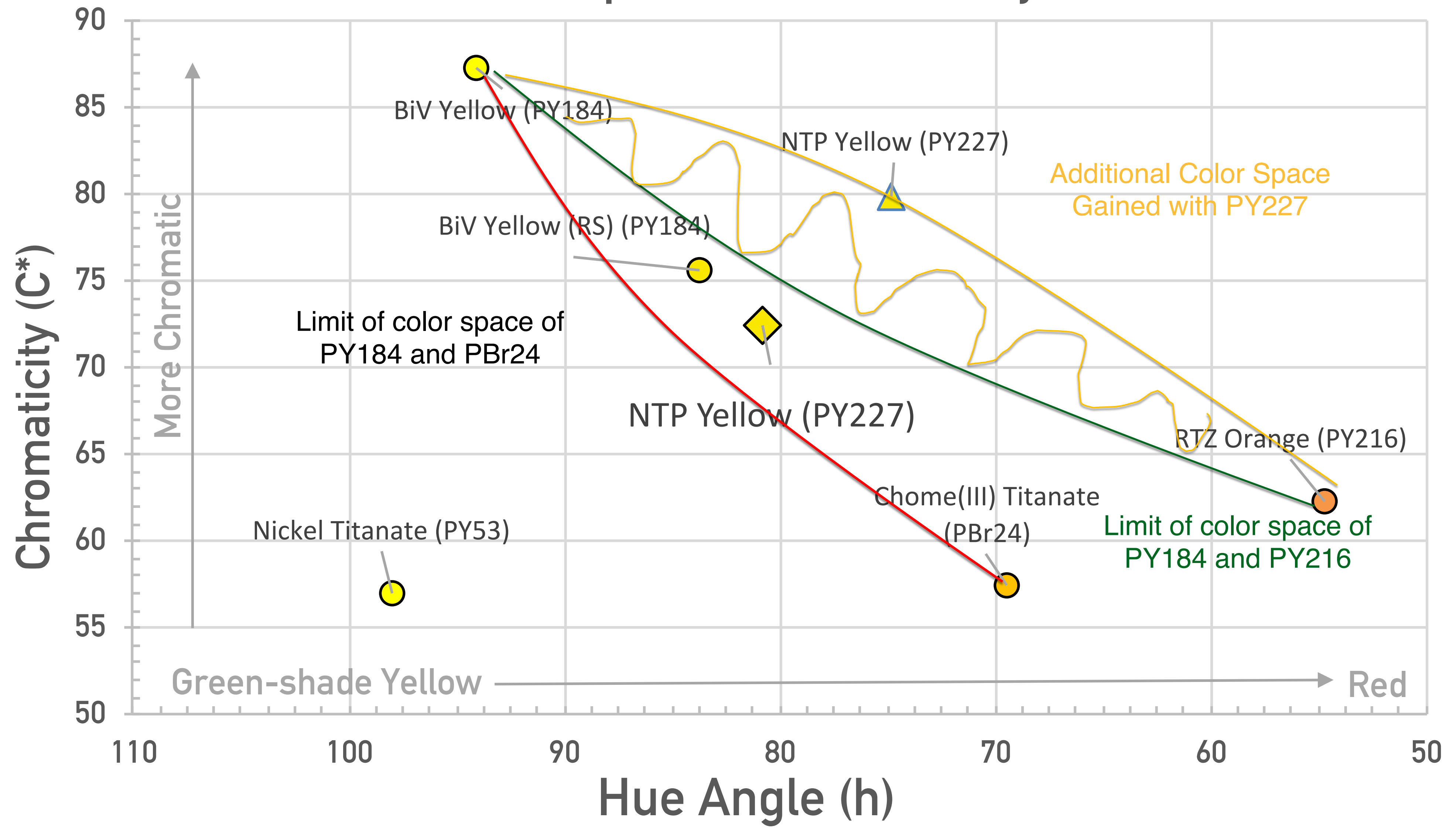
NTP Technology Expansion

Masstone Color Space - Chromaticity and Hue



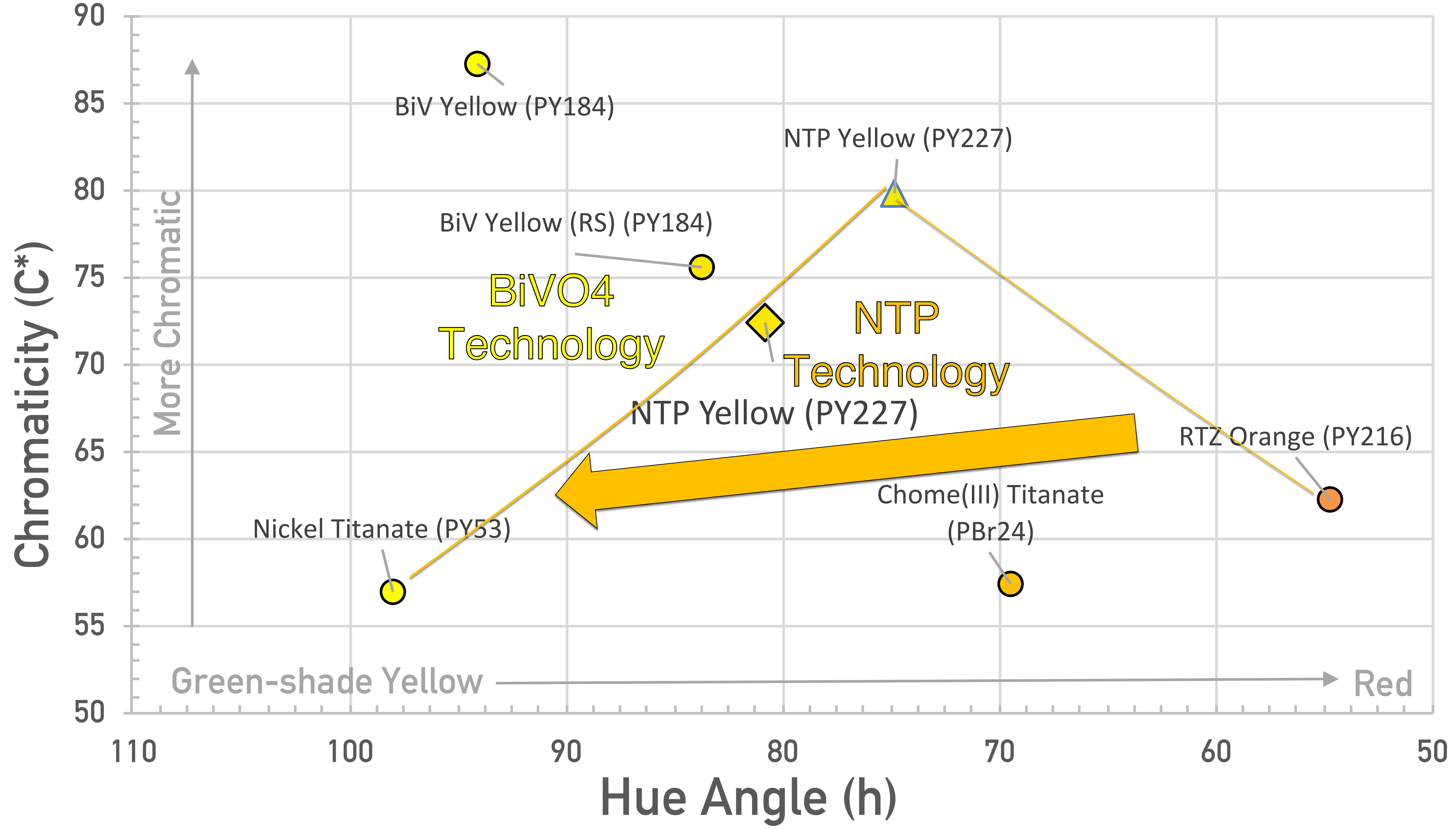
NTP Technology Expansion

Masstone Color Space - Chromaticity and Hue

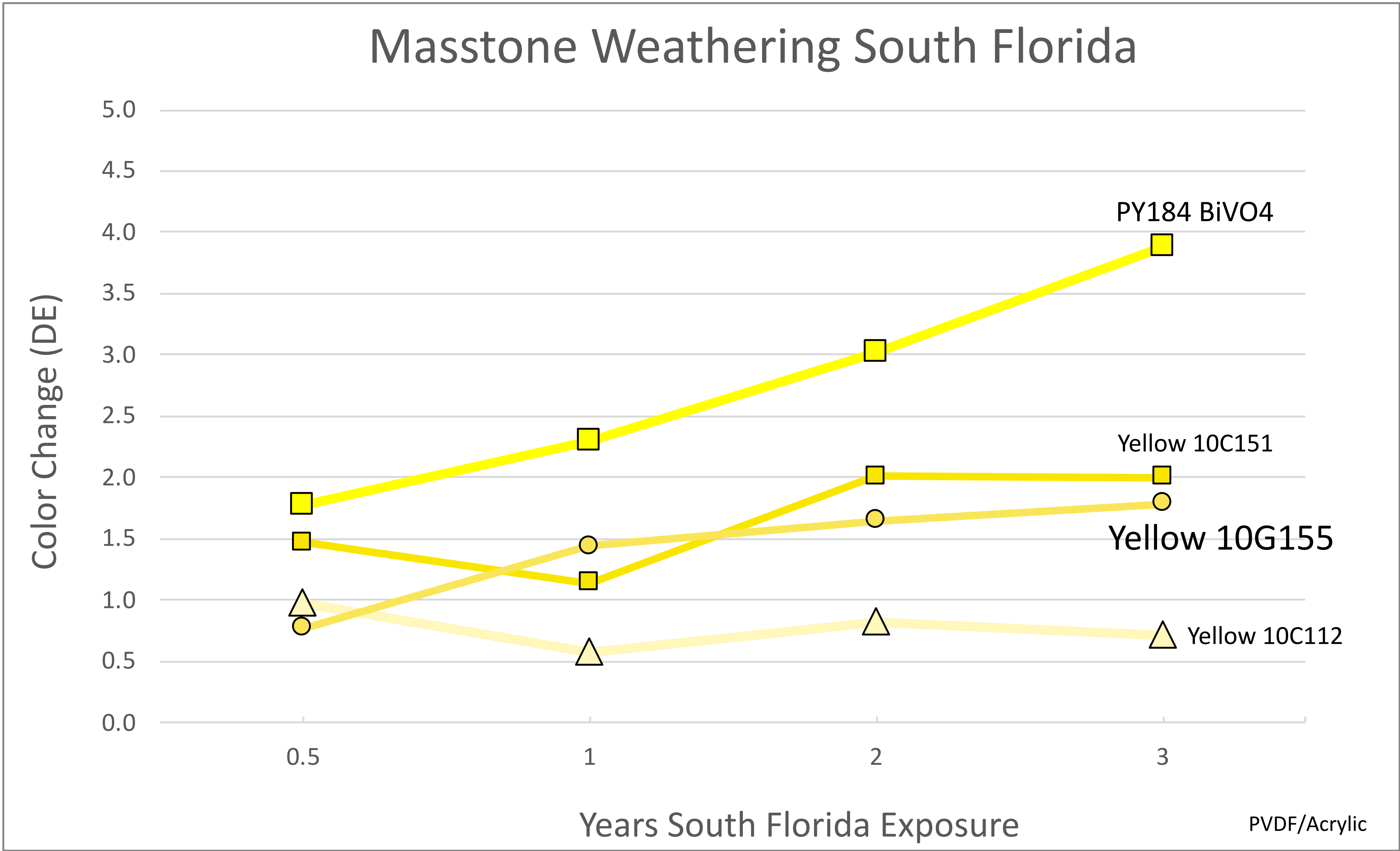


NTP Technology Expansion

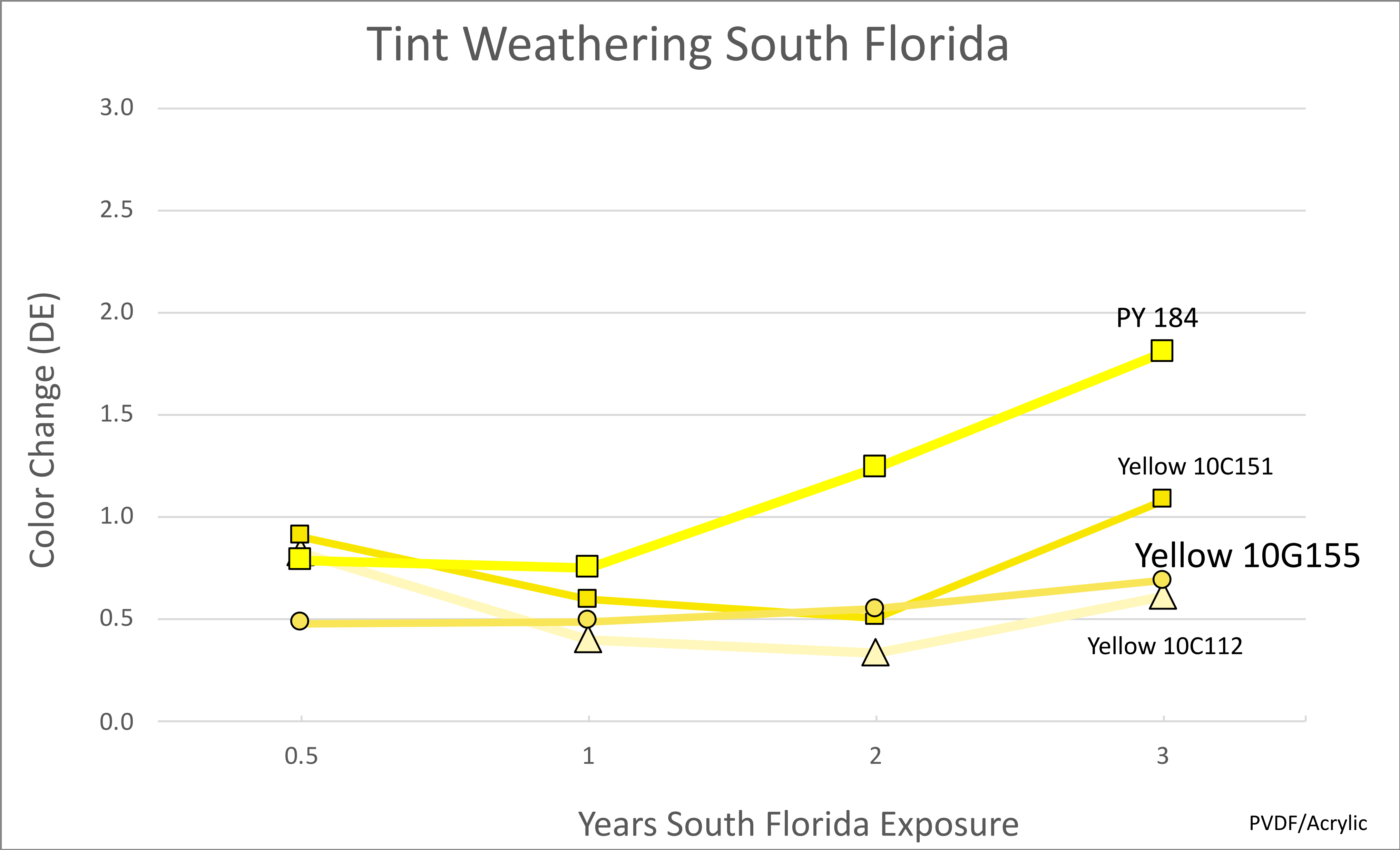
Masstone Color Space - Chromaticity and Hue



NTP Technology Expansion



NTP Technology Expansion



Multiple Resin Color Consistency

Acrylic Coating.

Acrylic Extrusion

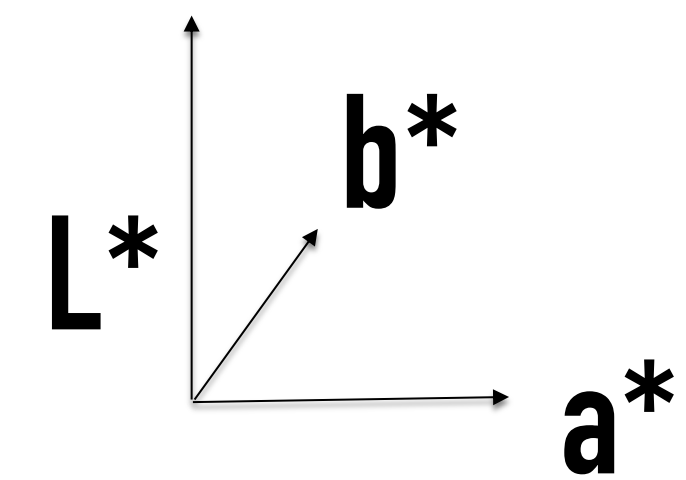
PVDF/Acrylic

Rigid PVC.

Polystyrene

RTZ Orange

Color Space Volume:23



NTP Yellow

Color Space Volume:37



Multiple Resin Color Consistency

Acrylic Coating.

Acrylic Extrusion

PVDF/Acrylic

Rigid PVC.

Polystyrene

Std. BV

Color Space Volume:125



Yellow 10G155

New NTP Tech

Color Space Volume:26



RS BV

Color Space Volume:676



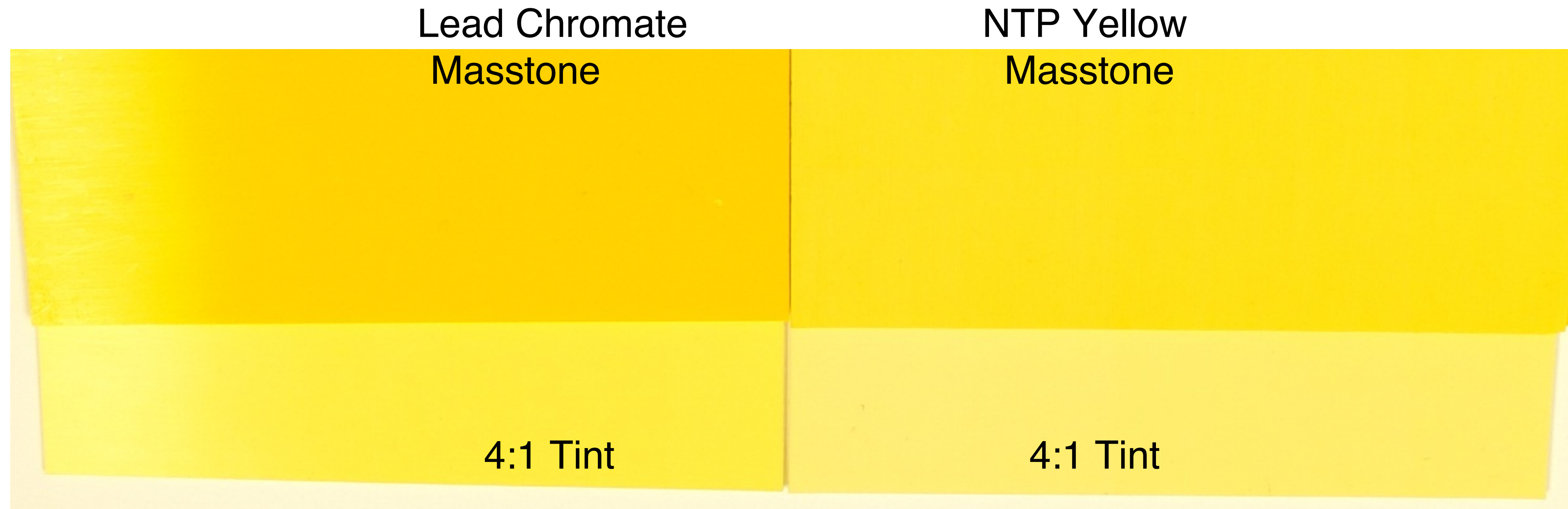
New NTP Technology Yellow 10G155

- Improved economics
- Close to Red-shade BiV Yellows
- No need for shell or heat stabilization
- Excellent weathering



...is what Bismuth Vanadate
always wanted to be.....

Versus Lead Chromate



- Similar Chroma and shade
- No silica shell to shear off
- No acid instability
- Advantages in regulatory area

Versus Bismuth Vanadate

PY 184 (GS)
Masstone

NTP Yellow

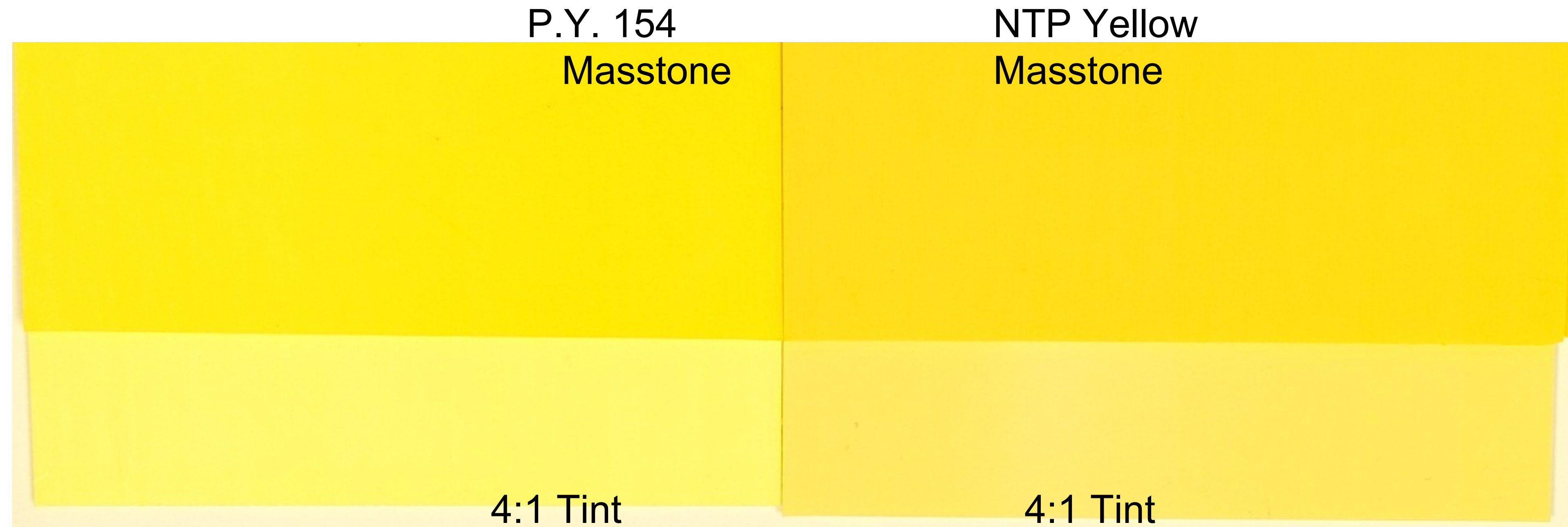
PY 184 (RS)
Masstone



4:1 Tints

- Not a direct competitor
- Higher opacity
- Greater heat stability
- Higher tint strength
- Greater acid/alkali resistance
- No shear sensitive silica shell

Versus organics



- Better stability in tints with white
- Higher opacity
- Higher heat stability

Physical Properties

Physical/Chemical Property	NTP Yellow (Typical Value)	RTZ Orange (Typical Value)	Units	Test Method+
Specific Gravity	5.5	4.5	n/a	SCTM 312
Loose Packing Density	6.7 0.80	6.7 0.80	lbs./gal kg/L	SCTM 194
Surface Area (BET)	3.5	7.3	m ² /g	SCTM 153
Percent Moisture	0.1	0.6	wt. %	SCTM 248
Mean Particle Size	0.9	1.3	microns	SCTM 183
Conductivity	14	110	μS/cm	SCTM 142
Oil Absorption	11	19	parts oil/100 parts pigment	SCTM134
pH	5.4	4.9	n/a	SCTM 101
Residue 325 Mesh	0.01	0.02	wt. %	SCTM 135
Heat Stability	600 320	600 320	°F °C	Observed

+SCTM refers to Shepherd Color Testing Method

Registrations

	NTP Yellow	RTZ Orange
USA TSCA	•	•
EU REACH	•	•
China	•	In process
Canada NDSL	•	•
Korea	•	•
Australia	•	•
Taiwan	•	•
New Zealand	•	•
Japan	•	•

Please contact us for specific and latest updates.

Regulatory Approvals

Color	AP(89)1	AS 2070-1999	EN71.3: 2013 (Category I)	EN71.3: 2013 (Category II)	EN71.3: 2013 (Category III)	CONEG & 94/62/EC	RoHS/ELV/W EEE	FDA	French Positive List	TCLPs	BfR	JHOSPA	HPB	SONY List	GB9685-2008	GB9685-2016	REACH Compliant
C.I. Pigment Yellow 216																	
RTZ Orange	✓	✓	1%	-	10%	✓	✓	-	-	✓	✓	-	-	✓	-	-	✓
	✓	✓	1%	-	10%	✓	✓	-	-	✓	✓	-	-	✓	-	-	✓
	✓	✓	1%	-	10%	✓	✓	-	-	✓	✓	-	-	✓	-	-	✓
C.I. Pigment Yellow 227																	
NTP Yellow	✓	✓	1%	-	10%	✓	✓	-	-	✓	✓	-	-	✓	-	-	✓
	✓	✓	1%	-	10%	✓	✓	-	-	✓	✓	-	-	✓	-	-	✓
	✓	✓	1%	-	10%	✓	✓	-	-	✓	✓	-	-	✓	-	-	✓

Please contact us for specific and latest updates.

New and Improved

CI Pigment Yellow 227
(Niobium Tin Pyrochlore)

- New patented chemistry
- Bright red-shade yellow
- High-opacity
- High-chromaticity
- Extremely inert
- High-temperature stable

Chromaticity



Opacity

CI Pigment Yellow 216
(Rutile Tin Zinc)

- Improved color space
- High opacity
- Excellent red tone
- Engineered for inertness
- Color synergist
- High-temperature stable

Durability

Highly Engineered Pigments

- High performance systems
- Corporate colors
- Coil & Extrusion
- Automotive
- ACE
- Transportation
- High durability thin films
- Signage applications
- Silicate Coatings



uHPP

NTP Yellow

CI Pigment Yellow 227

Coatings

- Dynamix Yellow 30C152
- NTP Yellow 10C151

Plastics

- NTP Yellow 10P150

NTP Yellow 10G155



RTZ Orange

CI Pigment Yellow 216

Coatings

- Dynamix Orange 30C342
- RTZ Orange 10C341

Plastics

- RTZ Orange 10P340



The Shepherd Color Company
We Brighten Lives

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YOU THINK?

Shepherd Color Website

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More Expertise
Better Performance
Best Value





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Creating beauty through color, without negatively impacting people or planet.

Color should only brighten lives. That's why we find and eliminate negative impacts in all aspects of our production.

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