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Barrier coatings for plastics and paper complying with latest food contact requirements

27.05.2025 | Martina Wienke

organization octima

organizzazione per la chimica e per la tecnologia innovativa dei materiali avanzati

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Agenda

- Overview of polymer dispersions
- Hydrazine free primer for BOPP
- Oxygen barrier on foil
- Oxygen barrier on paper
- Conclusion

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Overview of polymer dispersions

Alberdingk® U 4640 VP

- Polyurethane dispersion with exceptional adhesion to OPP films
- Excellent printability with different inks
- The product is in compliance with:

  (EU) 10/2011 | SWISS Ordinance 817.023.021 Annex X

- Solids-content: 27 - 29%
- pH-value: 8.0 – 9.0
- Viscosity: 20 - 100 mPas
- MFFT: ca. 0°C

Experimental PUD TM 146446

- Polyurethane dispersion with inherent oxygen barrier
- The product is in compliance with:

  (EU) 10/2011 | SWISS Ordinance 817.023.021 Annex X

• Solids-content:	14 - 16%
• pH-value:	7.5 – 9.5
• Viscosity:	10 - 500 mPas
• MFFT:	ca. 0°C

Alberdingk® AC 2005 VP

- Single phase acrylic dispersion
- The product is in compliance with:

  BfR XIV | BfR XXXVI | (EU) 10/2011 | 21 CFR 176.170 | 21 CFR 176.180 | SWISS Ordinance 817.023.021 Annex X

Used for e.g. paper (instead of PFAS) and foils packaging

- Solids-content: 49 - 51%
- pH-value: 7.0 – 9.0
- Viscosity: 20 - 2000 mPas
- MFFT: ca. 5°C

Alberdingk® PC 4750 VP

- Ready to use, for topcoats or single layer coats with excellent MVTR
- The product is in compliance with:
- BfR XIV | BfR XXXVI with restrictions | (EU) 10/2011 with restrictions | 21 CFR 176.170, 176.180 & 175.105 | SWISS Ordinance 817.023.021 Annex X

Used for food packaging with superior hydrophobicity (instead of PVDC coatings)

- Solids-content: 44 - 46%
- pH-value: 7.5 – 8.5
- Viscosity: 20 – 500 mPas

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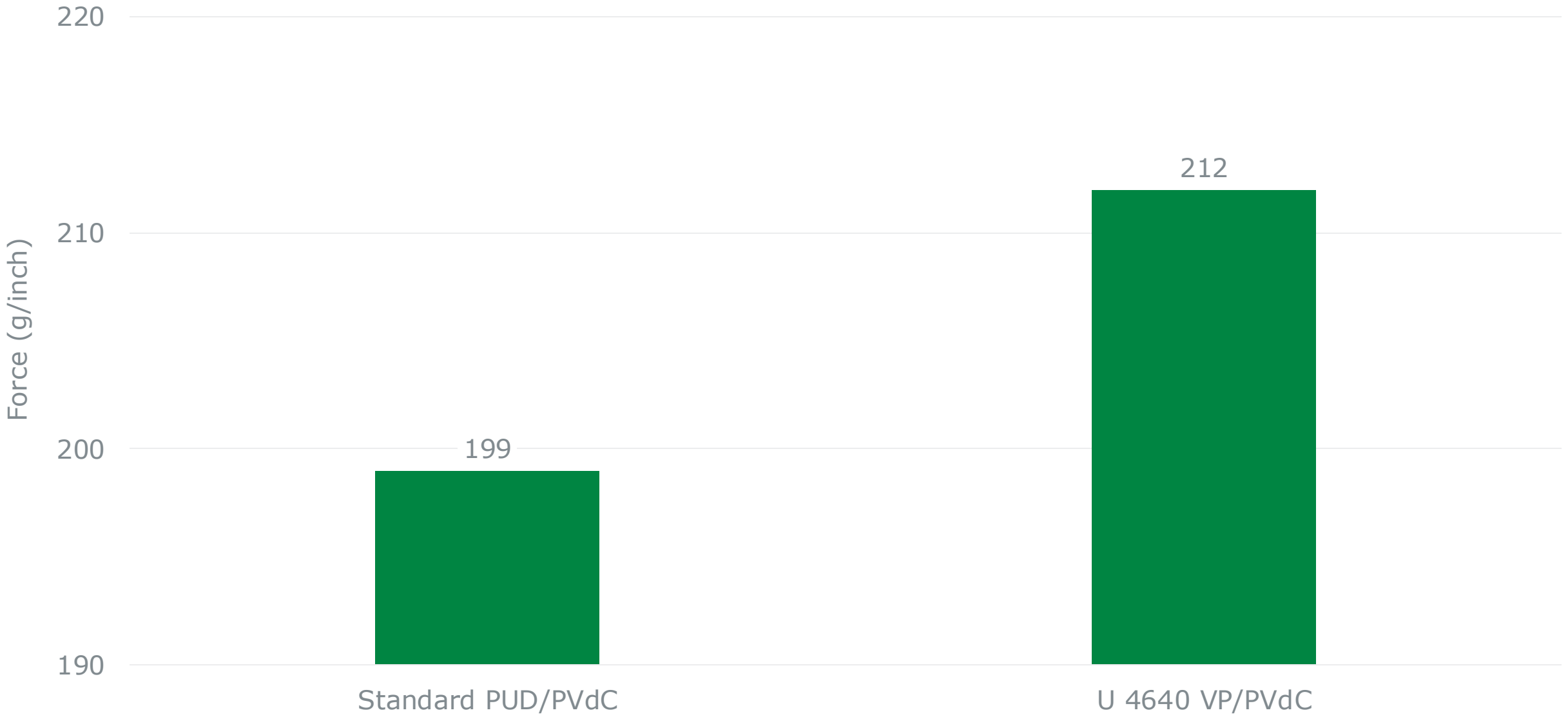
Hydrazine free primer for BOPP

Comparison of Standard PUD with
Alberdingk® U 4640 VP

Seal strength (120°C, 1s, 150N), BOPP 25µm corona treated



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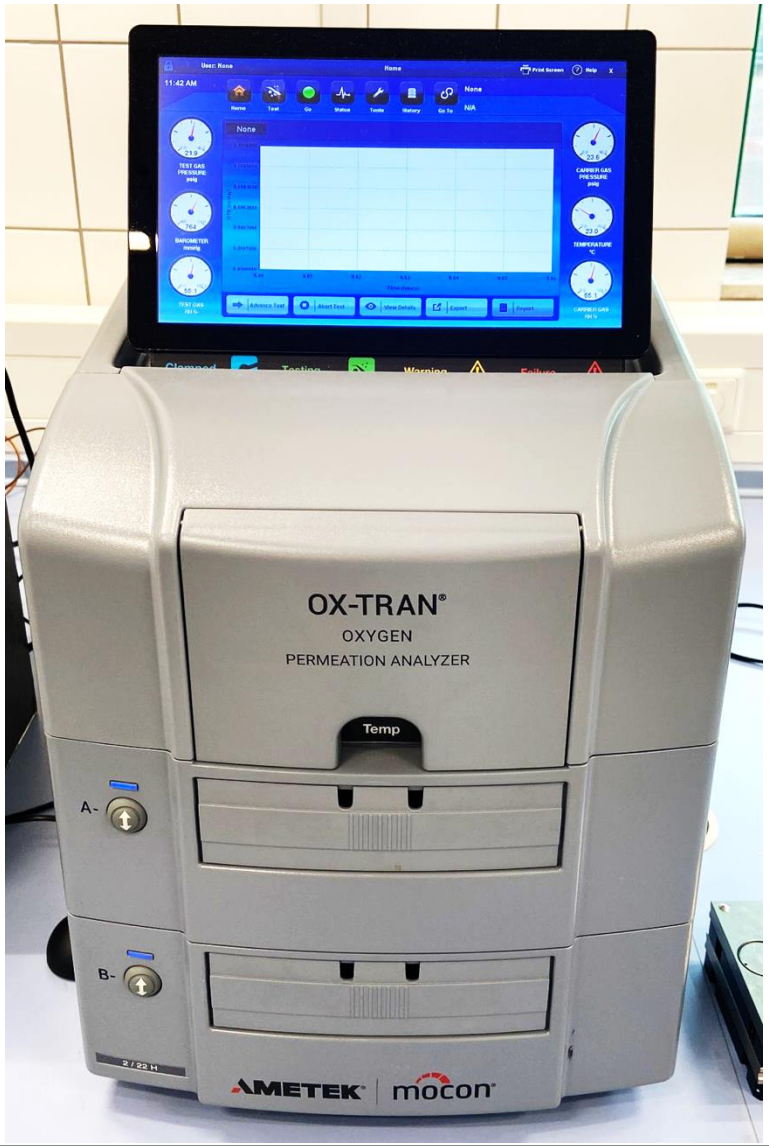
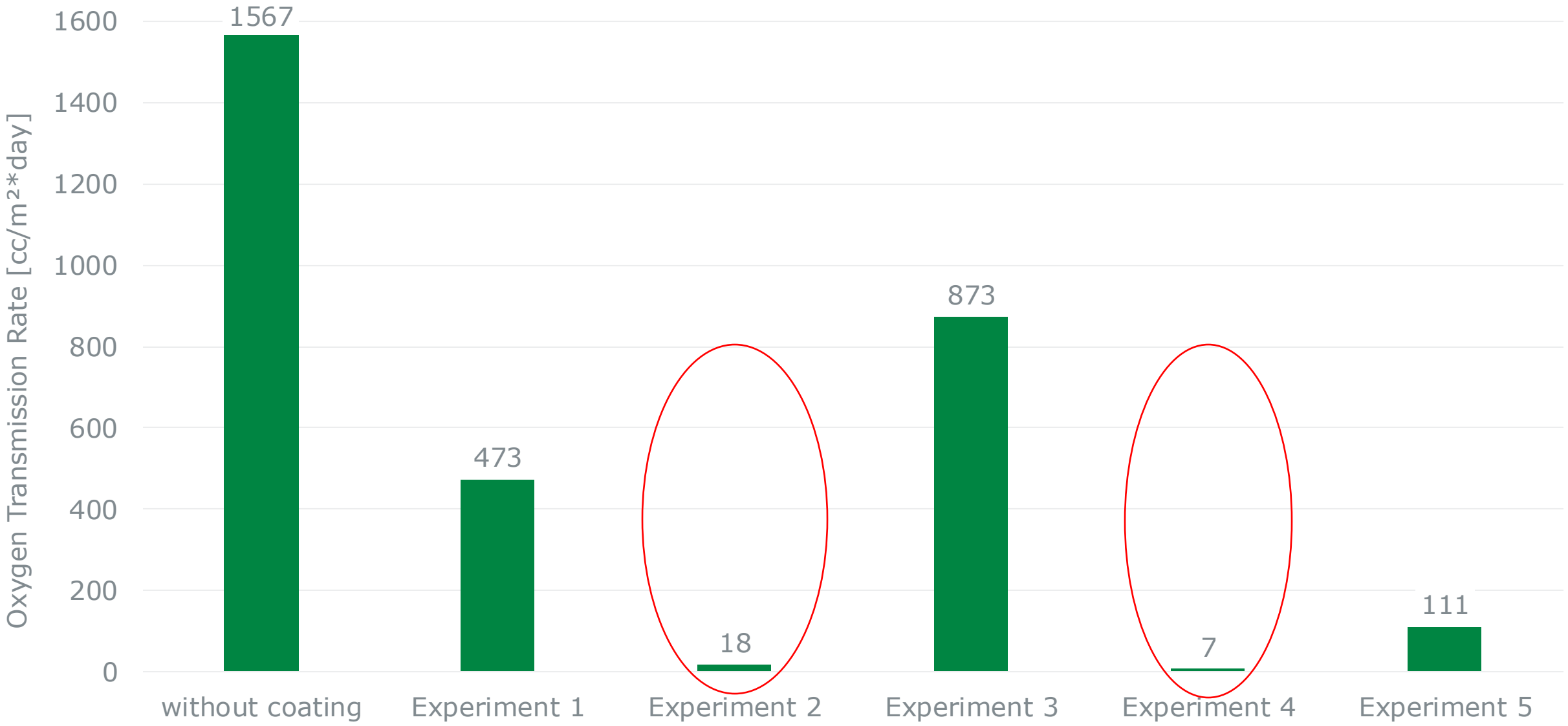
Oxygen barrier on BOPP foil, corona treated

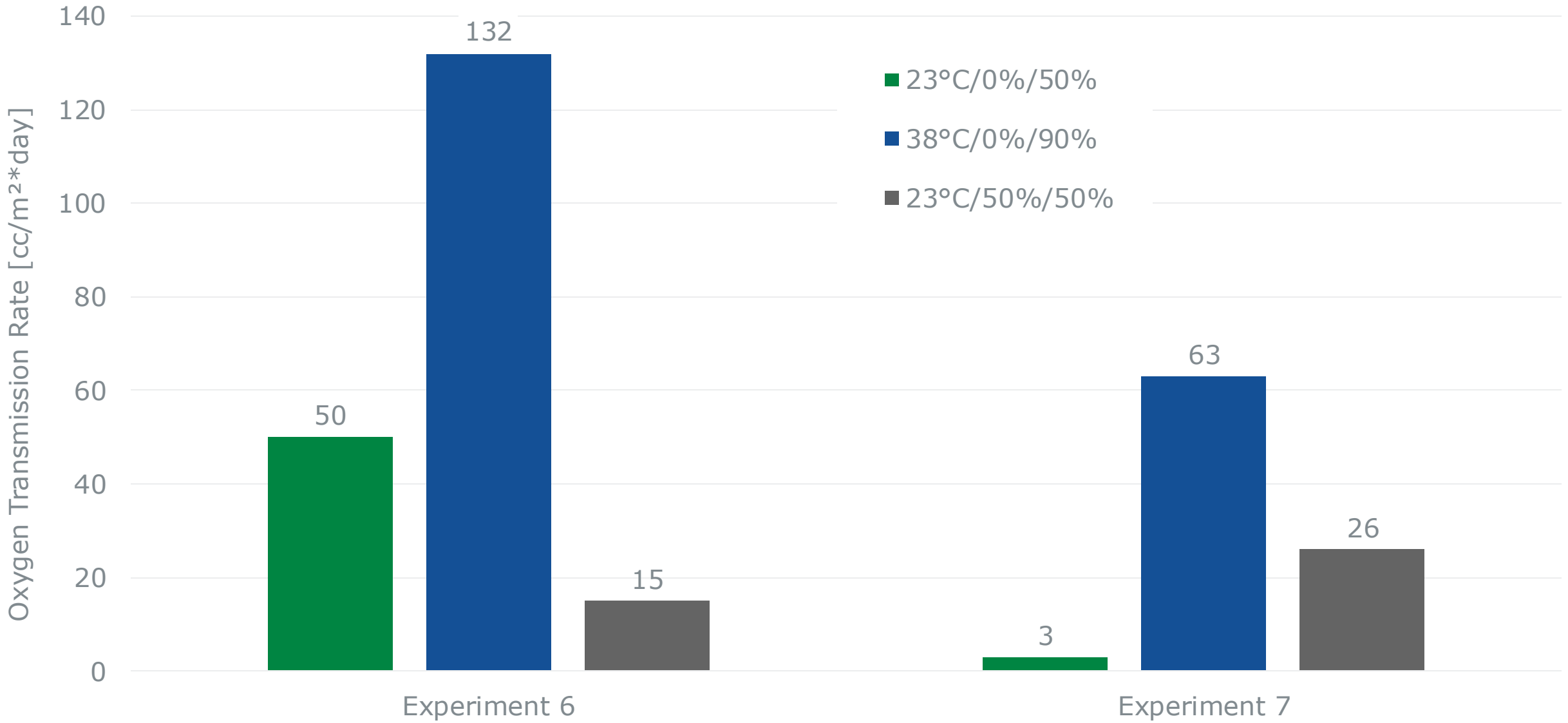
Oxygen barrier - Testing equipment



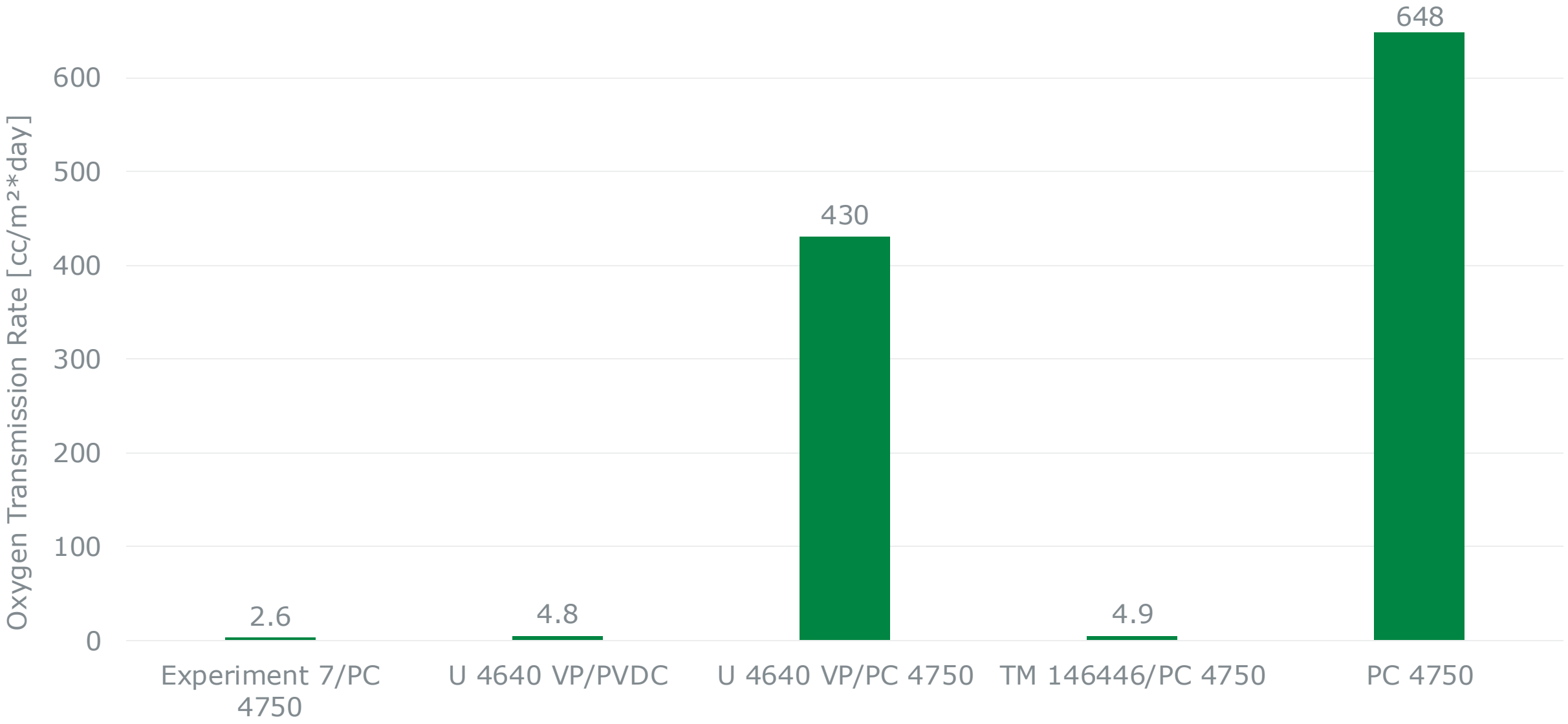
Oxygen barrier at 23°C/0% (5cm²), 6µm wet



Oxygen barrier, 6µm wet

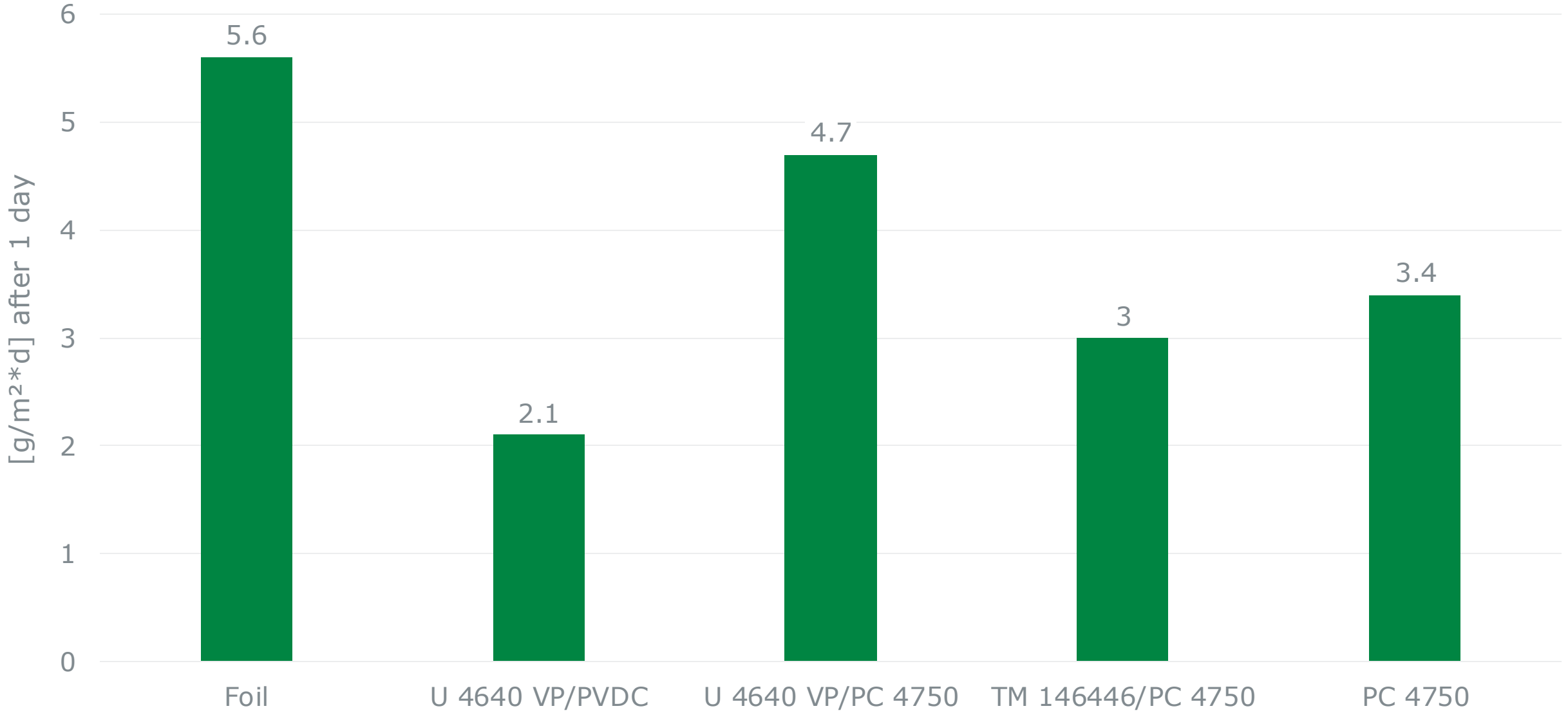


Oxygen barrier at 23°C/0% (5cm²), with PC 4750 as topcoat



MVTR (Moisture Vapour Transmission Rate) - Testing equipment

MVTR 38°C/90%


6
5
4
3
2
1
0
[g/m²*d] after 1 day
5.6
2.1
4.7
3
3.4
Foil
U 4640 VP/PVDC
U 4640 VP/PC 4750
TM 146446/PC 4750
PC 4750

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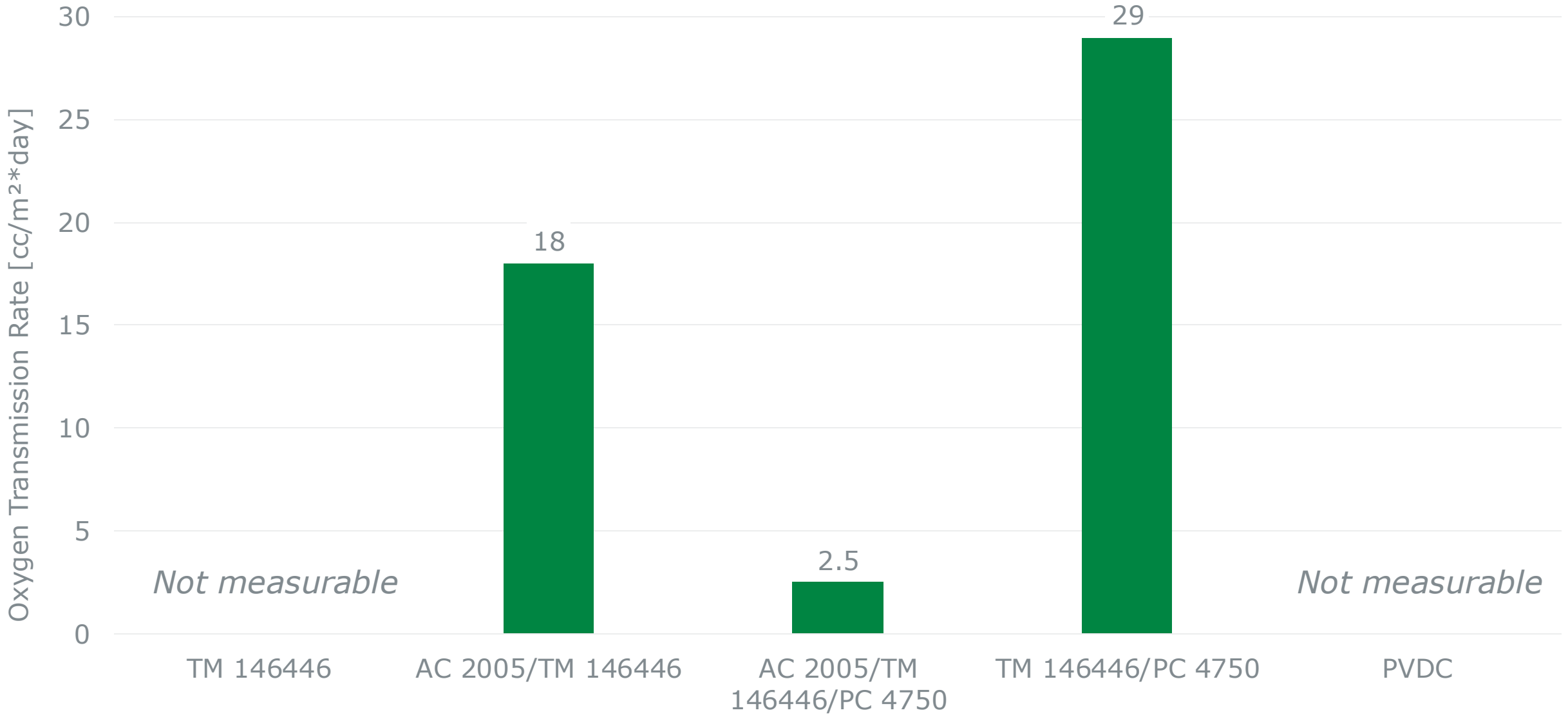
Oxygen barrier on UPM Solide™ Lucent paper (78g/m²)

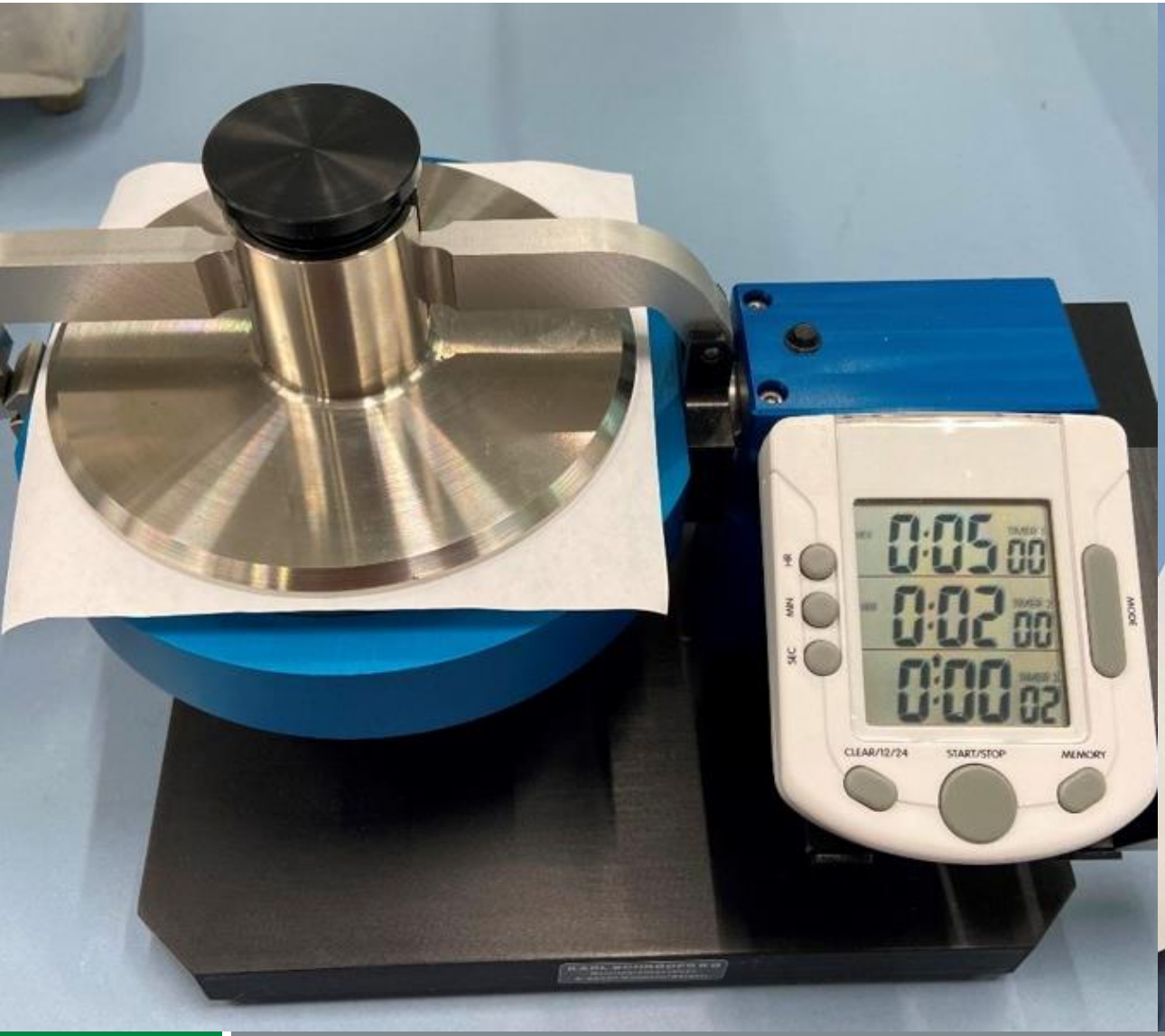
Trialing TM 146446 on paper substrate

- Oxygen-barrier Experimental PUD TM 146446
- PUD‘s are generally not listed in paper related food contact lists
  - EU: read accross from other regulations (EU 10/2011, BFR 14) to use barrier in indirect contact with food

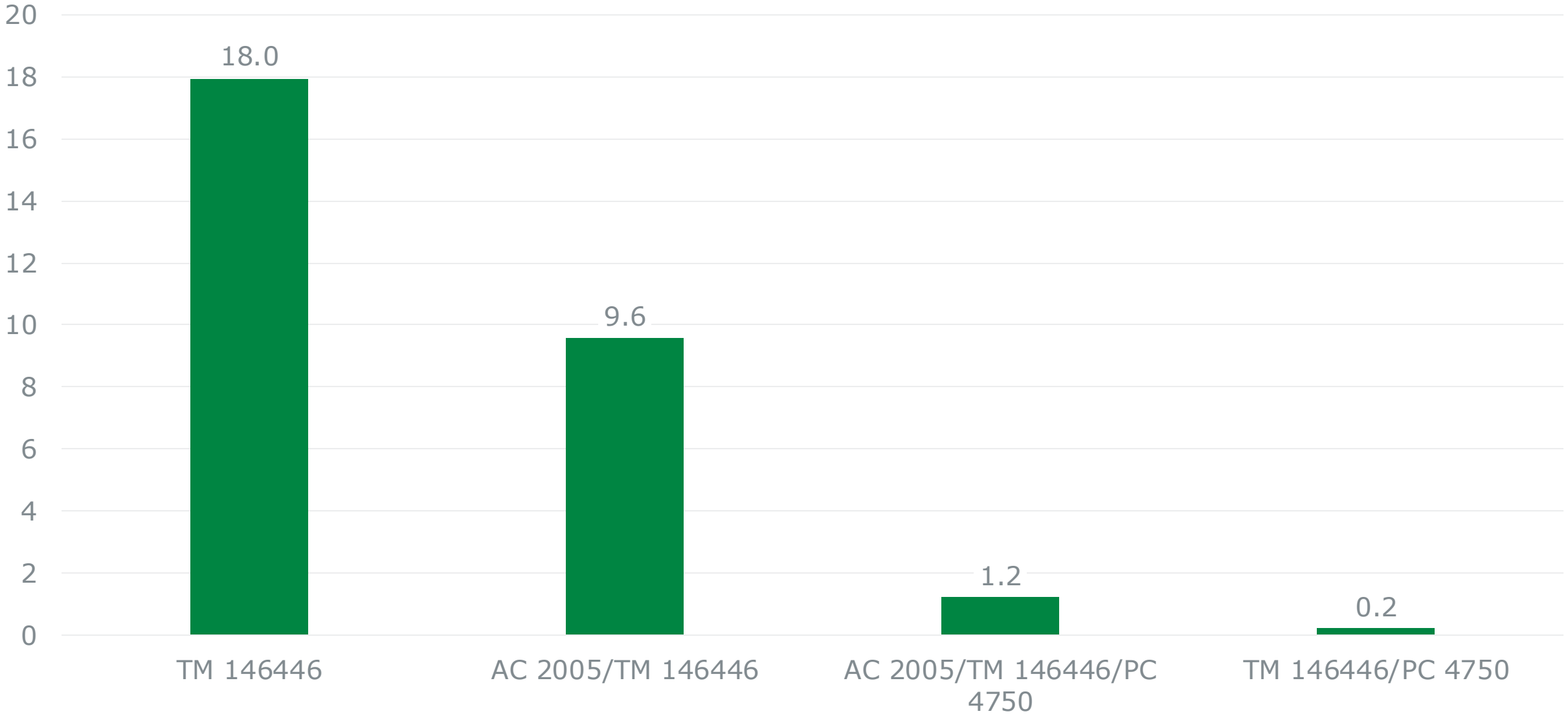
Oxygen barrier



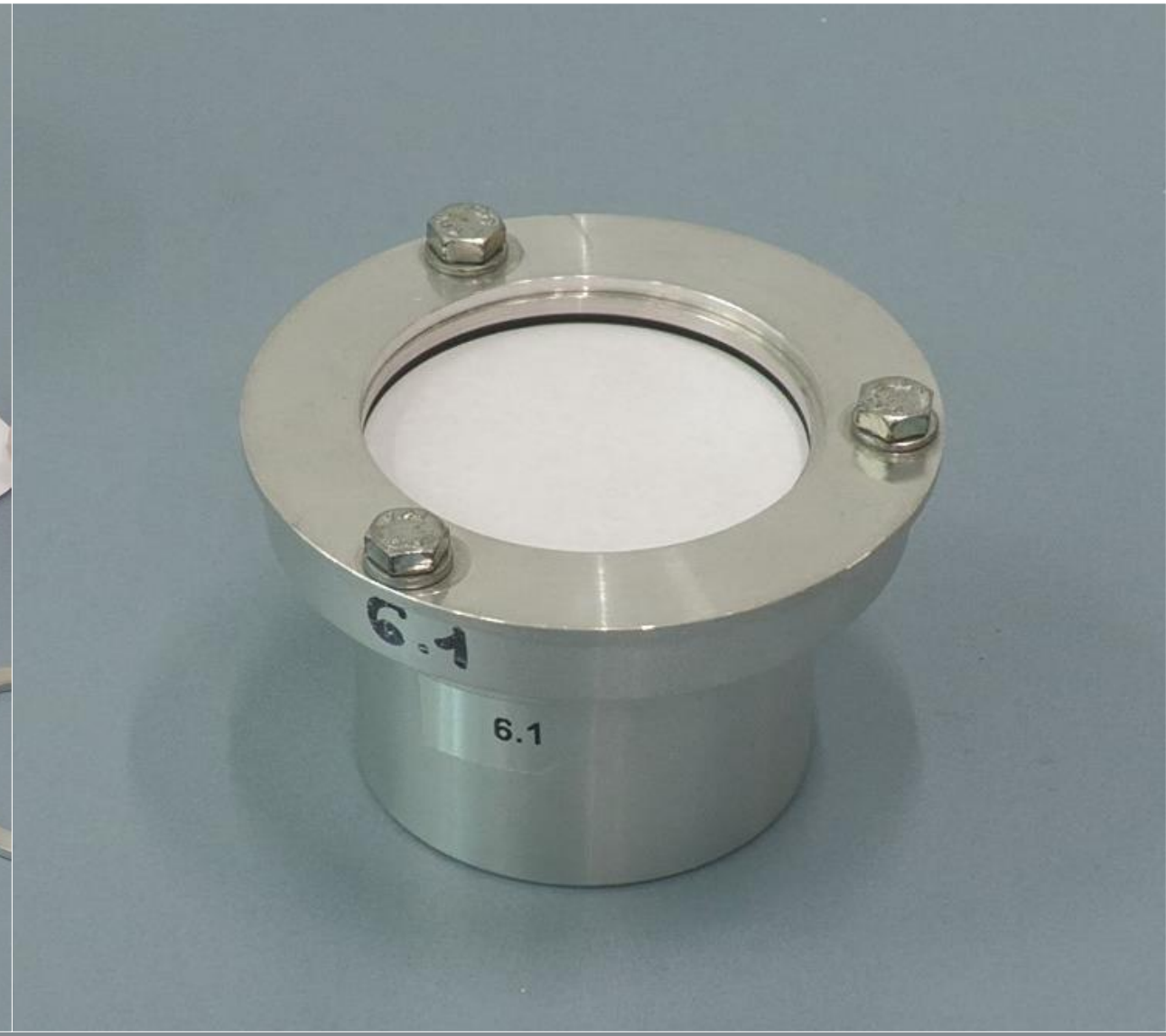
Cobb (Tappi T441)



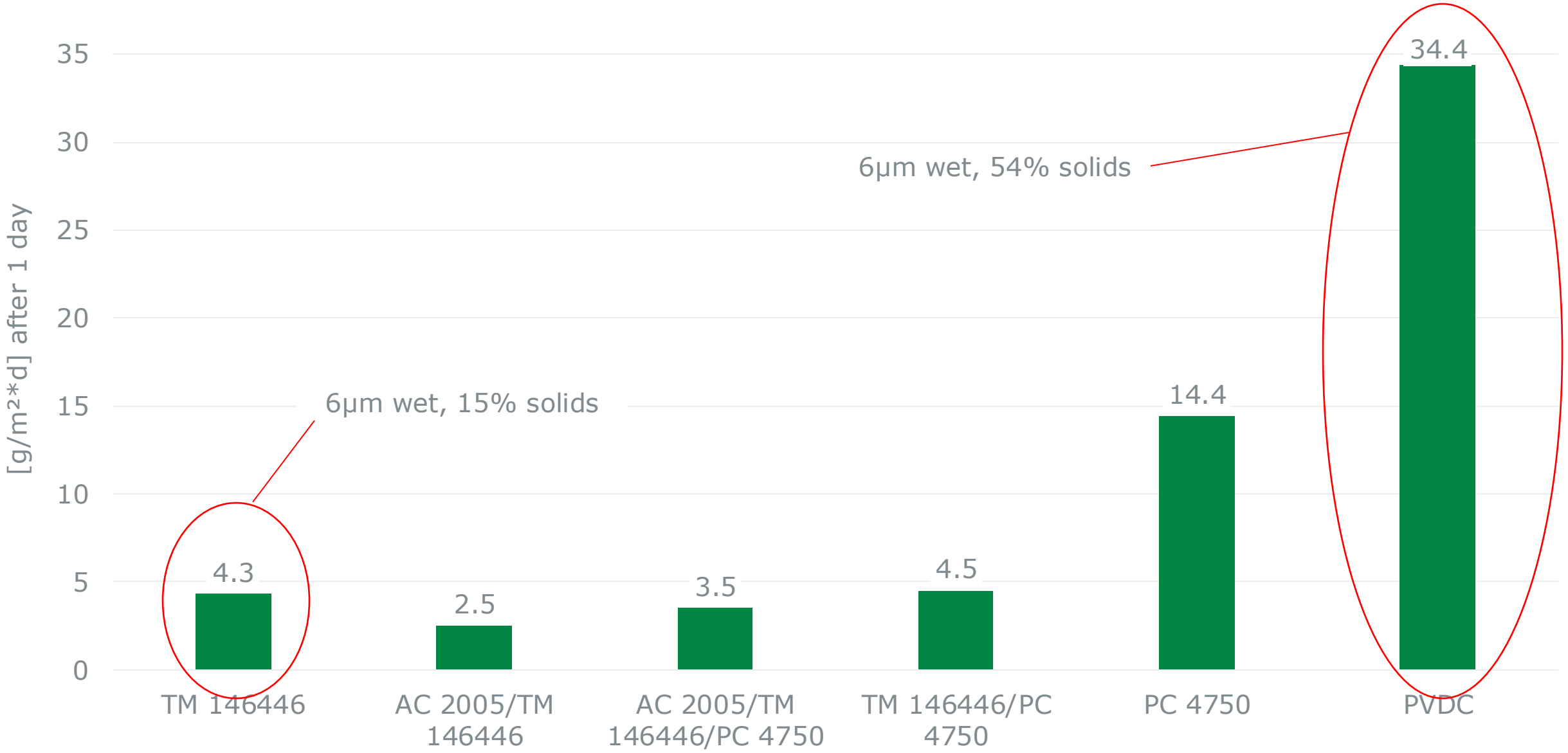
Cobb1800


20
18
16
14
12
10
8
6
4
2
0
18.0
9.6
1.2
0.2
TM 146446
AC 2005/TM 146446
AC 2005/TM 146446/PC 4750
TM 146446/PC 4750

MVTR (DIN 53122-1)



MVTR 38°C/90%


35
30
25
20
15
10
5
0
[g/m²*d] after 1 day
6µm wet, 15% solids
6µm wet, 54% solids
4.3
2.5
3.5
4.5
14.4
34.4
TM 146446
AC 2005/TM 146446
AC 2005/TM 146446/PC 4750
TM 146446/PC 4750
PC 4750
PVDC

Conclusion

- Alberdingk Boley can offer **hydrazine- and TEA-free** polyurethane dispersions (Swiss Ordinance compliant)
- Excellent **oxygen- and moisture vapour-barrier** on foil as well as on paper possible
- You have to use a **combination of different layers** to obtain the best result
- Further tests to improve oxygen barrier

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Disclaimer:

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