П'ята українська
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ЛАКОКРАСКА-UA®

5th Annual Ukrainian Paints &
Coatings Conference

PROFARB
grupa chemiczna

RESEARCH & PRODUCTION PLANT OF COPOLYMERS,
OŚWIĘCIM, POLAND

Hybrid silicone-acrylic water based dispersions as paint binders

Dr. Marek Mrzyczek

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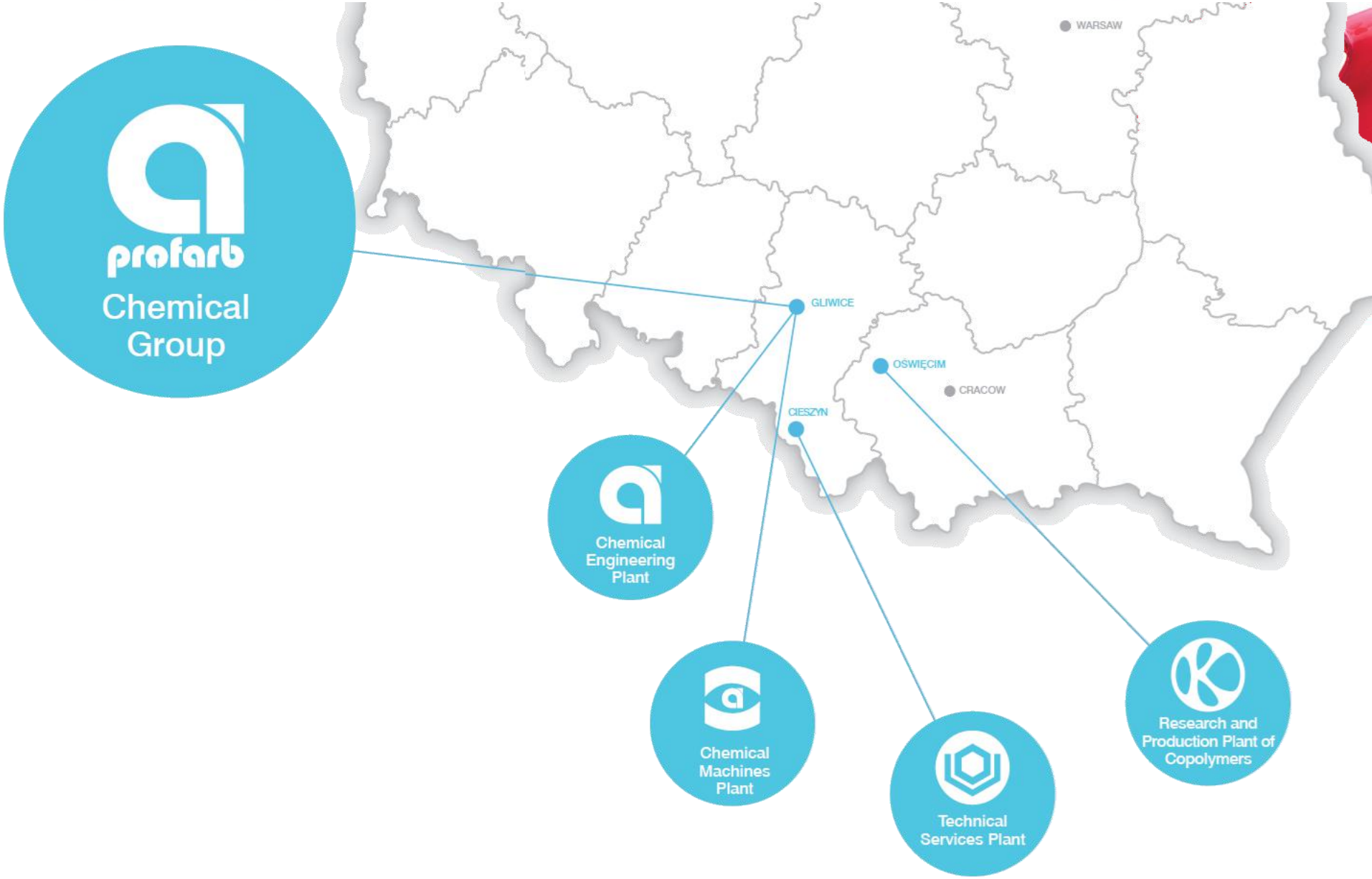
10-12.02.2015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PRODUCTS

SPECIALTY CHEMICALS

WATER DISPERSIONS

- ACRYLIC
- STYRENE – ACRYLIC
- VINYL ACETATE

SOLVENT RESINS

- ACRYLIC
- STYRENE – ACRYLIC
- VINYL ACETATE

Prooduct	Solvent	Solid content [%]	Viscosity [mPa·s]
Winprol M30	Methanol	30	15000 ÷ 25000
Winprol M45	Methanol	45	15000 ÷ 25000
Winprol E30	Ethanol	30	15000 ÷ 25000
Winprol E45	Ethanol	45	15000 ÷ 25000
Winprol E55	Ethanol	55	15000 ÷ 25000

Winprol

WATER DISPERSIONS

APEO Free

Dispersion	Solid content [%]	Viscosity [mPa·s]	Tg [°C]	MFFT [°C]	Base	Application
G-36	36	10 ÷ 40	5	0,5	Acryl-Styrene	Primers
G-36A	36	5 ÷ 20	7	- 0,5	Acryl	
DGP	30	5 ÷ 20	4	0	Acryl-Styrene	
DSK	50	2000 ÷ 4000	20	15	Acryl-Styrene	Paints & Plasters
FG-8	46	>1000	19	5	Acr-St-Maleic	
AFM	45	600 ÷ 1200	17	11	Acryl	
ASM	49	2500 ÷ 5000	16	11	Acryl-Styrene	
Prokryl 205S	49	2000 ÷ 4000	17	10	Acryl-Styrene	
TM	50	50 ÷ 500	19	17	Acryl	Mosaic Plasters
IWK-M	43	200 ÷ 600	-1	-1	Acryl	Impregnation
IWK-T	45	30 ÷ 200	37	22	Acryl	
DAD/M	41	200÷1000	40	44	Acryl-Styrene	Wood Paints
DAK	49	500÷1500	31	26	Acryl	

WATER DISPERSIONS

POLY (VINYL ACETATE)

Dispersion	Solid content [%]	Viscosity [mPa·s]	Tg [°C]	MFFT [°C]	Base	Application
PK-50	50	10000÷20000	-	-	Vinyl Acetate	Adhesives
Proacet D-2	51	12000÷18000	-	13	Vinyl Acetate	
Proacet D-3	50	10000÷20000	-	6	Vinyl Acetate	
FMP	49	>1500	21	7	Vinyl Acetate / Acryl	Paints
FDP	49	500÷2000	29	11	Vinyl Acetate / Maleic	

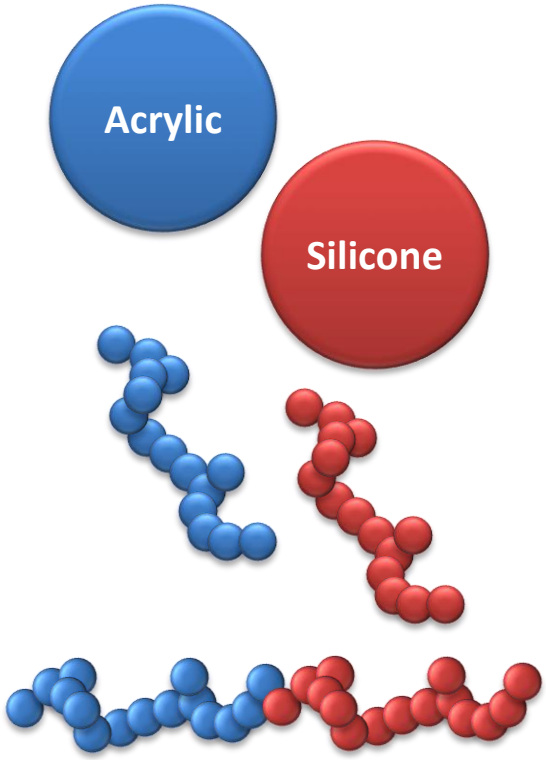
WATER DISPERSIONS

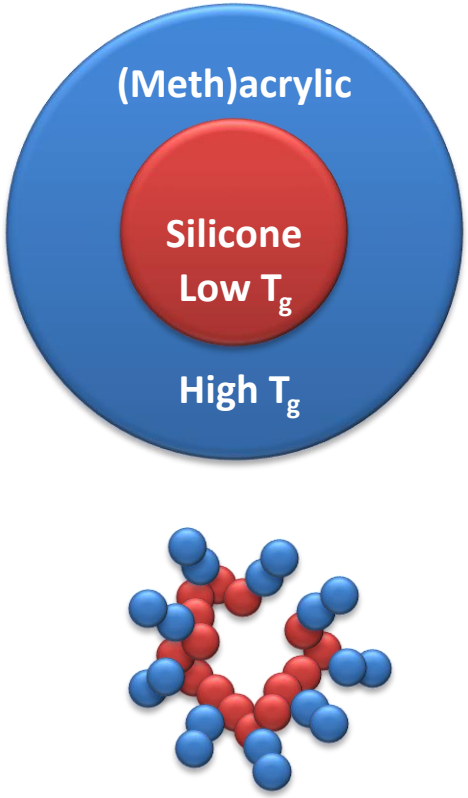
BUTADIENE BASED

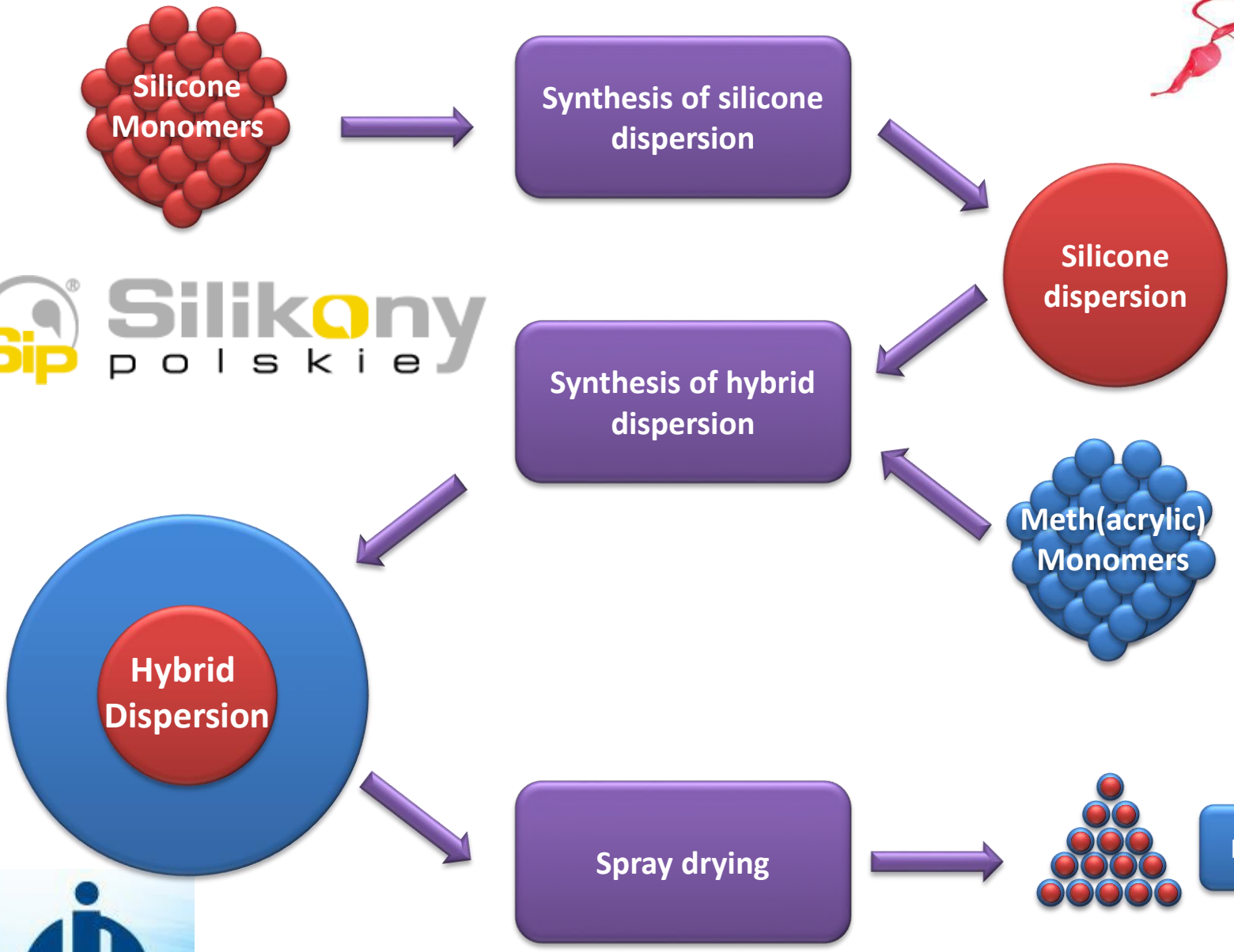
Dispersion	Solid content [%]	Viscosity [mPa·s]	pH	Additional monomers	Application
Lateks BS 3030	39	50-500	8,5-9,5	Styrene	Gaskets, Textiles
Lateks MP	40	15-150	3,0-70	Methyl methacrylate	
Lateks LBNK-2645	42	<100	8,0-9,0	Acrylonitrile, carboxyl, epoxy	Gaskets
Lateks XNBR-36M	43	<100	8,0-8,7	Acrylonitrile	
LBNK-3045M	44	<300	8,0-9,0	Acrylonitrile	Oil-resistan dip-products
Lateks W	>41	50-500	6,5-8,5	Styrene, acrylamide	Gas drilling
Procord VP	41	20-60	10,5-11,5	Styrene, vinylpyridine	Tyre cord adhesive

WATER DISPERSIONS

SILICONE-ACRYLIC



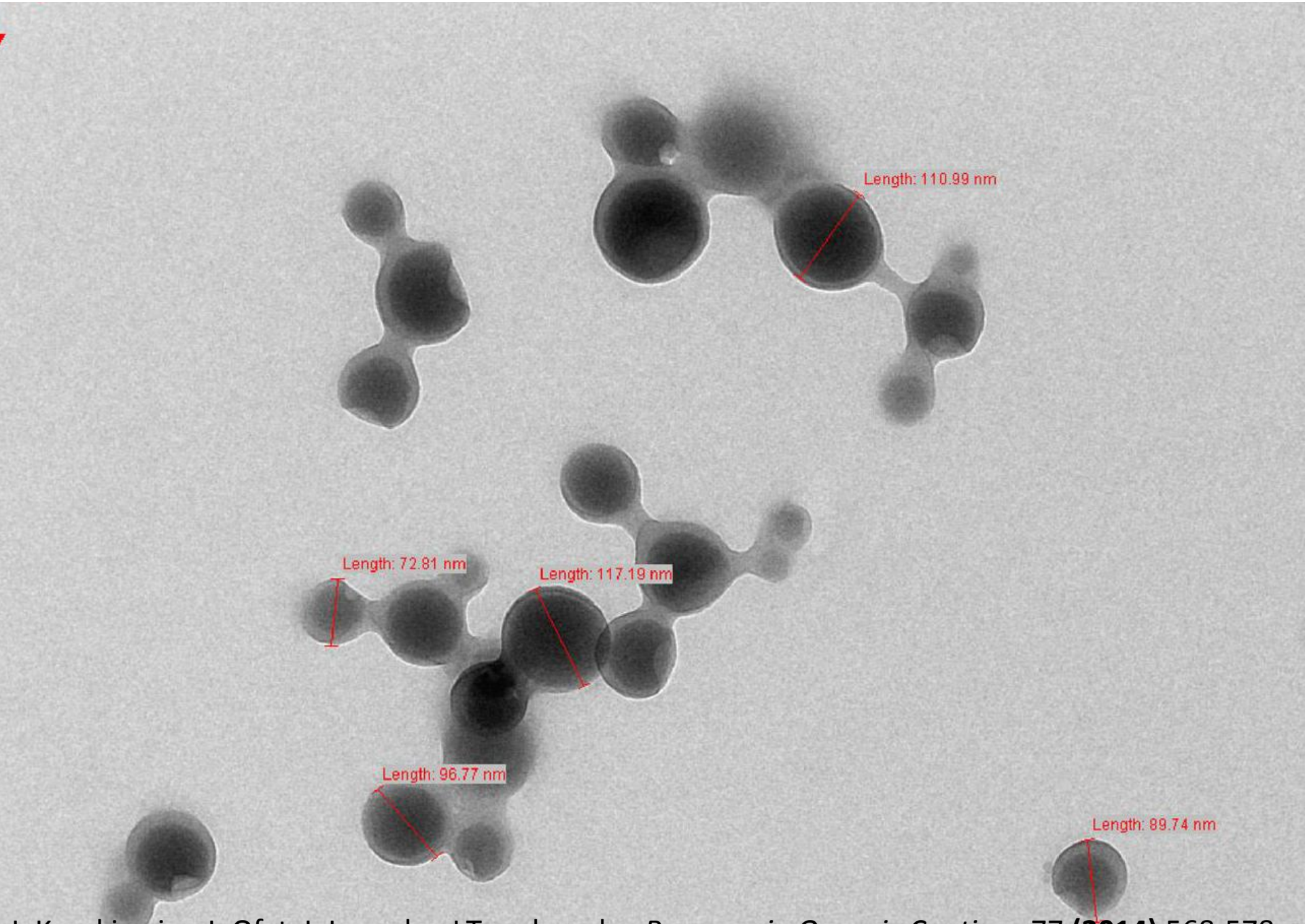




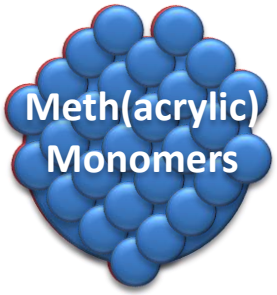
Silikony polskie

PROFARB grupa chemiczna

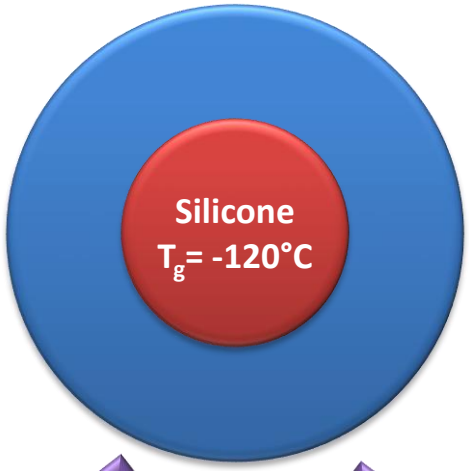
J. Kozakiewicz, J. Skarżyński, W. Domanowski, A. Koncka-Foland, A. Grott. *Polish Patent #210583* (2011)

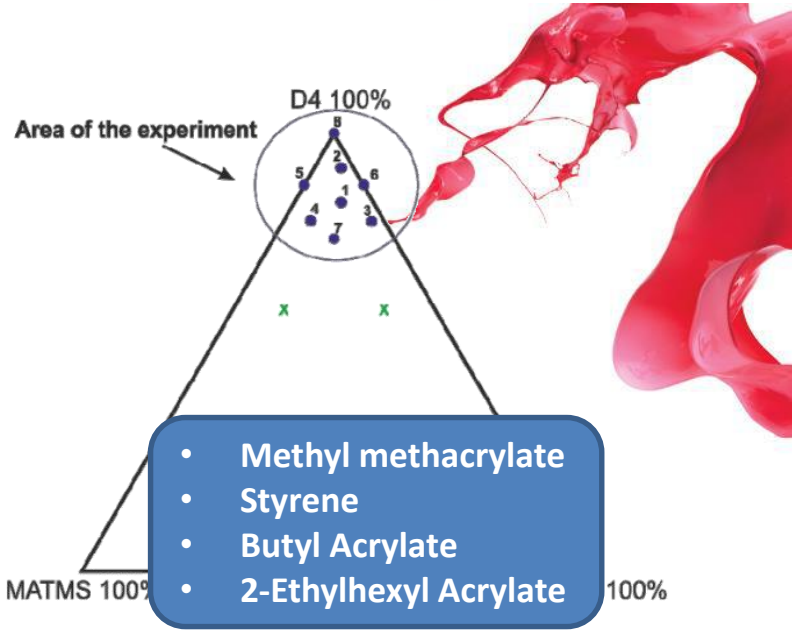


J. Kozakiewicz, I. Ofat, I. Legocka, J.Trzaskowska; *Progress in Organic Coatings* 77 **(2014)** 568-578

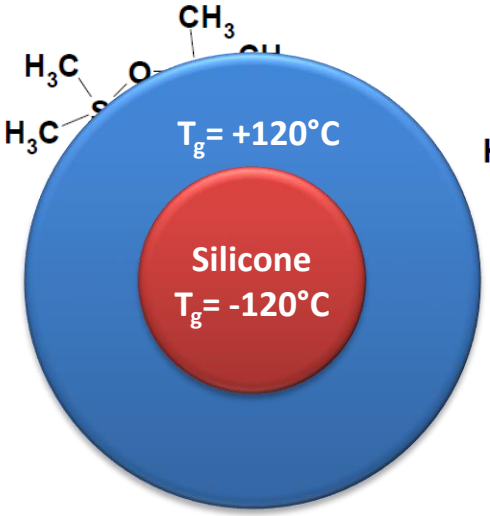


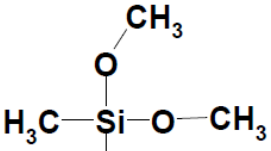
- Methyl methacrylate





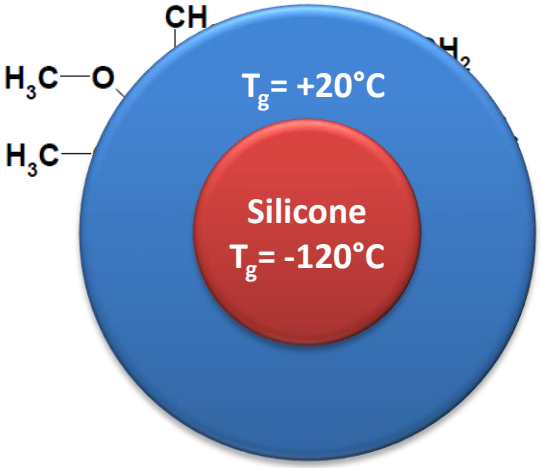
- Methyl methacrylate
- Styrene
- Butyl Acrylate
- 2-Ethylhexyl Acrylate





Powder coatings
PVC modifier

METMS



Hybrid Binder for exterial paints

1. J. Trzaskowska, J. Kozakiewicz; *Nano Studies*, 2013, 8, 7-16.
2. J. Kozakiewicz, I. Ofat, I. Legocka, J.Trzaskowska; *Progress in Organic Co*

The National Centre for Research and Development

Application, effects, properties

Silicone-methacrylic powders:

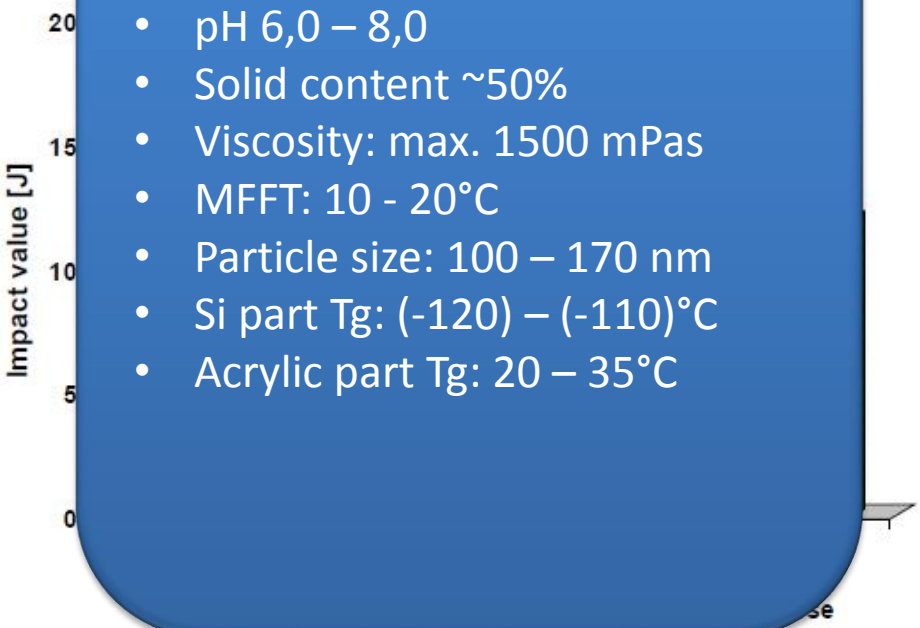
- Polyester and epoxy-polyester powder coatings:
  - Great increase in impact resistance.[1]
  - Increase of thermal resistance.[2]
- Modifier in vinyl chloride polymerisation.[3]
- Higher abrasion resistance of Polyurethane powder coatings.[4]
- Enhancement in impact, tensile and flexural strenghts of PLA.[5]

Silicone-acrylic dispersion:

- **Binder for paints & plasters with enhanced properties**

Expected paramters:

- pH 6,0 – 8,0
- Solid content ~50%
- Viscosity: max. 1500 mPas
- MFFT: 10 - 20°C
- Particle size: 100 – 170 nm
- Si part Tg: (-120) – (-110)°C
- Acrylic part Tg: 20 – 35°C



1. J. Kozakiewicz, I. Ofat, J. Trzaskowska, H. Kuczyńska; Industrial Progress in Organic Coatings 2015, **78**, 419–428.
2. J. Trzaskowska, J. Kozakiewicz; *Nano Studies*, 2013, **8**, 7-16.
3. A. Abramowicz, M. Obloj-Muzaj, J. Kozakiewicz; Journal of Materials Science and Engineering B 2014, **4** (6), 152-162.
4. B. Pilch-Pitera, J. Kozakiewicz, I. Ofat, J. Trzaskowska, M. Spírková; *Progress in Organic Coatings.* 2015, **78,** 429.
5. R. Jeziórska, A. Szadkowska, B. Świerz-Motysia, J. Kozakiewicz, *Polimery,* 2012, **57** (5), 354-363.

Application properties

Parameter	Acrylic	Mixture	Hybrid
Pigments miscibility	↑	↓	↑
Stability	↑	↓	↑
Steam permeability	↓	↑	↑
coatings structure homogeneity	↑	↓	↑
water resistance	↓	↑	↑
stain resistance	↓	↑	↑
wet abrasion resistance	↓	↑	↑

Production capacity ~17 000 tons / year

- **Vinyl acetate dispersions**
  7000 / year
- **Acrylic dispersions**
  5000 tons / year
- **Solvent resins**
  4000 tons / year
- **Butadiene latexes**
  1000 tons / year

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Research & Production Plant of Copolymers

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POLAND

Thank you for your attention

Literature

1. J. Kozakiewicz, J. Skarżyński, W. Domanowski, A. Koncka-Foland, A. Grott. *Polish Patent #210583* **(2011)**
2. J. Trzaskowska, J. Kozakiewicz; *Nano Studies*, **2013**, 8, 7-16.
3. J. Kozakiewicz, I. Ofat, I. Legocka, J.Trzaskowska; *Progress in Organic Coatings* 77 **(2014)** 568-578
4. J. Kozakiewicz, I. Ofat, J. Trzaskowska, H. Kuczyńska; *Industrial Progress in Organic Coatings* **(2015),** 78, 419–428.
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6. B. Pilch-Pitera, J. Kozakiewicz, I. Ofat, J. Trzaskowska, M. Spírková; *Progress in Organic Coatings,* **(2015),** 78, 429.
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