Polymer modification is a **KEY** for creating **polymer composite** materials.
The development of industry and increasing demands of qualitative and quantitative terms caused the need to expand the range and variety of properties of polymer materials. It is satisfied both by a synthesis of new polymers and by modification of the properties of known polymers.

**Market challenges in the field of composite materials and technologies**

- Weight reduction of the product
- Decreasing the cost of the product
- A synergy of the best properties of composite components
- Ecological purity of the production process and the composite material
- Industrial scalability of modification technologies
Many polymers are **immiscible** and **incompatible** by nature.

**Polymer modification can solve this problem** by the changing of chemical and physical structure of materials.

As a result, it is possible to develop **new composite materials** with a unique combination of physical and chemical features:

- Impact resistant
- Abrasive resistant
- Fire retardant
- Chemical resistant
- Low-temperature resistant
- Barrier property and etc.
Since 2000 our team has been developing innovative polymer modification technologies and product applications to satisfy very specific market requirements across many polymer fields, based on previous projects and different development fields:

2000 “Ozone knife”
https://www.youtube.com/watch?v=AemYK_hGZXM&feature=youtu.be

2007 “Olenta” group of companies http://www.olenta.ru/

2011 “Metaclay” https://youtu.be/p0hWs-GtZXQ(METACLAY)


The company has achieved good demand for its products throughout Europe which it can now service through Slovenian facilities which are capable of manufacturing and supplying 3500-4000 tons of product per year.
BUSINESS MODEL: STRUCTURE AND FEATURES

Structure
- POROUS
- GRAFTING
- ALLOYING
- CROSSLINKING

Features
- Comprehensiveness
- Innovations
- Flexibility
**BUSINESS MODEL: COMPREHENSIVENESS**

<table>
<thead>
<tr>
<th>TECHNOLOGIES</th>
<th>Slovenia</th>
<th>Israel</th>
<th>Italy</th>
<th>Germany</th>
<th>USA</th>
<th>France</th>
<th>Czech</th>
<th>India</th>
<th>China</th>
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<tbody>
<tr>
<td>Flow induced crystallization</td>
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<td>Solid Phase Grafting</td>
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<td>✓</td>
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<td>Nitroxide Mediated Polymerization</td>
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</tbody>
</table>
To support its unique modification technologies, GP has built the R&D center including Laboratory and Synthesis facilities.
BUSINESS MODEL: FLEXIBILITY

- CUSTOM MADE products
- Prompt reacting on Market HOT SECTORS requirements
- Fast production SCALE-UP
GP PLACE IN MANUFACTURING CHAIN

REFINERS
Raw materials PE, PP, PS, PET...
Borealis, Sabic, Total, MOL...

GRAFTABOND
GRAFTALEN

MODIFIERS
GRAFT/BLOCK

CO-CONTINUOUS ALLOYS;
GRAFTAMID™
GRAFTALLOY™

COMPOUNDERS
(polymer-polymer)
(polymer-filler)

GRAFTAMERS
GRAFTAMER TRC (thermo-reversible crosslinking)
GRAFTAMER VTR (vitrimer)

PROCESSORS

GRAFT POLYMER BUYERS;
Compounders,
Processors,
Refiners

R&D
<table>
<thead>
<tr>
<th>TARGET MARKETS</th>
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</thead>
<tbody>
<tr>
<td><strong>Automotive</strong></td>
</tr>
<tr>
<td>• Thermo adhesive film</td>
</tr>
<tr>
<td>• Sound deadening foams</td>
</tr>
<tr>
<td>• Fuel tank</td>
</tr>
<tr>
<td><strong>Plastic compounds</strong></td>
</tr>
<tr>
<td>• Impact modifiers for PA, PET, PBT, PPS, POM</td>
</tr>
<tr>
<td>• Coupling agents for HFFR and composites</td>
</tr>
<tr>
<td>• Compatibilization of recycled plastics</td>
</tr>
<tr>
<td>• Automotive compounds</td>
</tr>
<tr>
<td><strong>Energy</strong></td>
</tr>
<tr>
<td>• Photovoltaic panel</td>
</tr>
<tr>
<td>• Cables compounds (LV, MV, HFFR)</td>
</tr>
<tr>
<td><strong>Packaging</strong></td>
</tr>
<tr>
<td>• Tie layer for multilayers barrier films and extrusion lamination</td>
</tr>
<tr>
<td>• Sealing and Seal/Peel resins</td>
</tr>
<tr>
<td>• Oxygen barrier layer</td>
</tr>
<tr>
<td><strong>Construction</strong></td>
</tr>
<tr>
<td>• Additives for bitumen rutting resistance</td>
</tr>
<tr>
<td>• Adhesive for pipe coating</td>
</tr>
<tr>
<td>• Aluminium panels</td>
</tr>
<tr>
<td><strong>Hot melt adhesives</strong></td>
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<tr>
<td>• Deep freeze hot melt adhesives</td>
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<tr>
<td>• High stability hot melt</td>
</tr>
<tr>
<td>• EVA binder</td>
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<tr>
<td><strong>Military and space</strong></td>
</tr>
<tr>
<td>• Bespoke products across multiple fields</td>
</tr>
<tr>
<td>• Innovation lead</td>
</tr>
</tbody>
</table>

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TARGET MARKETS

- Automotive
- Plastic compounds
- Energy
- Packaging
- Construction
- Hot melt adhesives
- Military and space

4 March 2020
WHAT MAKES GP UNIQUE

- Use **proprietary co-agents** and **redox initiating system** for grafting.
- Use of **Nitroxide Mediated Polymerization** for controlled grafting reactions.
- **Co-continuous nano-morphology** approach for creation polymeric alloys.
- **Interpenetrating Polymer Networks (IPN)**
- **Thermo-Reversible Crosslinking polymers** and **Vitrimer**s.
- **Smart Polymers**
  - **Self-Healing** polymers.
- In-house synthesis of unique “**nitroxide stable radicals**” (TEMPO) for high-tech composite materials – proprietary process.
THE PLANT

Cutting edge +1,000m² production and R&D facility

Scalable modular operations with land secured for expansion

Research, develop and test various combinations of polymer solutions

Production capacity of up to 4,500 tons of product per annum

Able to produce multiple products and ship to clients on demand

Collaboration with the Faculty of Polymer Technology (FTPO Slovenia)
Highly supportive business-friendly jurisdiction within the European Union. Excellent infrastructure including road/ rail connections and an the international sea port. Highly skilled workforce operating at competitive wage levels. European centre for injection moulding particularly in the vehicle industry extends technical competency.
An efficient raw material supply chain was established, and the first product samples produced.

2018
- Mechanical installation of plant completed.
- Establishment of European manufacturing facility with highly qualified staff.
- Fully operational.

2019
- Continues development
- Commercialized orders

2020
- The distinct business model with more than 50 products across 5 divisions.
**GLOBAL GRAFTING SIDE-EFFECTS**

- **Crosslinking** for ETHYLENE polymers
  - (Melt Flow Rate of PE usually reduced considerably)
  - For melt grafting up to 10 times
  - For Solid Phase Grafting up to 2-3 times

- **Betta-Scission** (de-polymerization) for PROPYLENE

- Polymers Peroxides usually have very **harmful post-residues**:
  - Free unreacted peroxides and radicals lead to polymer aging and degradation in time
  - Treat-Butyl Alcohol (TBA) residues restricted in certain application up to 20ppm
  - High Yellowness Index (YI)

- **Gel** availability exist and influence on:
  - Mechanical Strength and Elongation of final product
  - Film transparency
  - Scotch effects in film and cable processing

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**GP UNIQUENESS - GRAFTING**

- **Use of Nitroxide Mediated Polymerization** for controlled grafting reactions
- **Use proprietary co-agents and redox initiating system** for grafting
ALLOYS

GRAFT POLYMER - UNIQUENESS

- Co-continuous nano-morphology approach for creation polymeric alloys
- Interpenetrating Polymer Networks (IPN) unique hybrid crosslinking techniques.
- Melt Processable alloys based on Ultra High Molecular Weight Polyethylene
- High temperature service elastomeric alloys
CROSSLINKING

GRAFT POLYMER - UNIQUENESS

- **Thermo-Reversible** Crosslinking polymers (High temperature resistance),
- Interpenetrating Polymer Networks (IPN) unique hybrid crosslinking techniques.
- **Smart Polymers** – switching temperature behavior.
- **Self-Healing** polymers

PO-g-MAH - Hydroxylamine
PO-g-MAH - Diol
PO-g-TEMPO - Isocyanate
PO-g-TEMPO - Peroxide
PO-g-Furan - Bismaleimide
SYNTHESES

GRAFT POLYMER - UNIQUENESS

- **Halogen Free Flame Retardant** based on Boron alkoxides.
- Synthesis of Hyper Branched Polymers (HBP) and Drug Delivery Systems (DDS).
- Synthesis of unique “nitroxide stable radicals” for novel high-tech synthesis.
PROSPECTIVE DEVELOPMENTS

AEROGEL
withstand temperatures up 650°C

- Industrial and petrochemical equipment
- Power generation equipment
- Fire protection equipment
- Aerospace & aeronautic transportation

NANODIAMOND
Nano diamond polymer composites

- Increasing abrasion resistance
- Increasing thermal conductivity without affecting electrical isolation
- Reducing the coefficient of thermal expansion
- Extending temperature limits of operation
PROSPECTIVE DEVELOPMENTS

POSS
Nanostructured chemicals

Applications
- Significant enhancement of high temperature modulus
- Improvement in heat distortion temperature
- Robust against chemical attack and can withstand strong acids and alkali for long periods

IONIC LIQUID

Applications
- Environmentally-friendly reaction
- Green chemistry and based on the properties of
  - Easy separation
  - Low toxicity
  - Selective miscibility
  - ILS play an important role in organic synthesis as the green alternative solvent
PROSPECTIVE DEVELOPMENTS

OXAZOLINES
VERSATILE POLYMER PLATFORM FOR BIOMEDICINE

- Improve drug stability in the formulation
- Tunable release rate by polymer chain length/composition
- Slow down release rate of hydrophilic drugs

NANOCARRIERS FOR DRUG DELIVERY

- Smart nanostructured materials can deliver drugs to the target sites with reduced dosage frequency and in a (spatial/temporal) controlled manner
- Mitigates the side effects experienced with traditional therapies
BOARD OF DIRECTORS

Victor Bolduev  
Managing Director / CTO  
Globally renowned chemist and founder of Graft Polymer with over +20 years of international polymer industry experience, particularly in polymer modification  
Author of 5 patents in the field of polymer modifications. Developed a lot of products brands for various polymer projects

Roby Zomer  
Executive Chairman  
Entrepreneur with +10 years’ experience in the biotech and renewable energy sectors. Roby led Israeli regulation for Alternative Energy, managed African-European Carbon Emissions Control and Carbon Emissions Reduction projects and is MD of MGC Pharmaceuticals, (ASX:MXC)

Pavel Kobzev  
Director / CMO  
+10 years of experience in project management and markets analysis. He served in the Israeli Defence Forces Elite Intelligence 8200 unit as Managing Operations Leader and has specific expertise in the security solutions and design industries

Anthony Eastman  
Director / CFO  
Chartered Accountant with many years’ experience in financial management and corporate advisory services. Previously worked with Ernst & Young and CalEnergy Gas Ltd, a subsidiary of Berkshire Hathaway Group and is currently advising several public and private companies across a range of industries and jurisdictions

Tim Wise  
Non-Executive Director  
Tim is an Entrepreneur with a passion for business development, communication and strategy. He is the founder and former CEO of Kalina Power (ASX : KPO) and Australian Franchise group - The Tap Doctor.  
Tim works closely with Craig Burton’s investment company based in Australia, which is a major shareholder and backer of GP UK. Tim is a Non-Executive Director of Phos Energy Ltd Melchor Group.
ADVISORY TEAM

Alexandr Zelenetskii
Scientific Advisor
A Doctor of Chemistry of Science, Professor with +40 years experience in polymer science and has authored many patents for polymer modification and scientific publications in the field of solid phase chemical reactions and grafting.

Antolii Chalykh
Scientific Advisor
A Doctor of Chemistry with +35 years’ experience in polymer science. He was Head of Laboratory for Structure & Morphology at the Research Institute of Physics, Chemistry and Electro-Chemistry (RAS) in Russia and is a laureate of two state awards in chemistry & author of many patents and publications in polymer science.

Brett Mitchell
Corporate Advisor, Chieftain Securities
A corporate finance executive with over 20 years of experience in the corporate finance, technology and mining industries. He has been involved in the founding, financing and management of both private and publicly-listed resource companies and holds executive and non-executive directorship roles. Brett was instrumental in GP UK’s creation, financing and business strategy.
Model focussed on maximising distribution/sales and market visibility globally

Sales professionals in place supported by management team to execute
CORRENT COMPANY ACHIEVEMENTS

Portfolio of patented, cutting edge, proven polymer modification products focused on the growing polymer manufacturing market

Customized solutions using breakthrough technologies developed over the last 15 years

State-of-the-art R&D and production facility in Slovenia with expansion capacity

Significant barriers to entry including IP protection; pricing and know-how

Substantial opportunity for revenue growth through an established partnership network

Highly experienced team with a successful track record in the polymer industry

Strong market dynamics – products which add substantial value to a large existing, and growing market
CERTIFICATES

Member of BPF and ISO 9001 approved Slovenian facilities
THANK YOU

CONTACT INFO

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pavel@graftpolymer.com
www.graftpolymer.com