Introduction to EP Modifier

Tech center. Rubber/specialty polymer division. LG chem
## Product Line-up

### Acrylic Impact Modifiers
- **IM812**: Excellent Impact Strength & Weatherability
- **IM810**: Dynamic Thermal Stability
- **IM809**: Wide processing window
- **IM808A**: 1-pack Grade
- **S20**:

### MBS
- **Transparent MBS**
  - **MB872**: Good Balance of Impact & Optical Properties
  - **MB885**: Excellent Transparency
  - **MB802**: Excellent Impact Strength & Efficiency
  - **MB838A**: Anti-crease Whitening
- **Opaque MBS**
  - **MB838A**: Superior low temp. Impact Strength

### Processing Aids
- **PA910**: General Purpose
- **PA828**: High Molecular Weight
- **PA930**: Better Hot Tensile Strength
  - **Better Foam Extrudability**

### EP Modifiers
- **EM500**
- **EM500A**
- **EM505**
- **EM600**
- **EM600A**

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## Portfolio of EP modifier

<table>
<thead>
<tr>
<th>Property</th>
<th>EM500</th>
<th>EM500A</th>
<th>EM505</th>
<th>EM600</th>
<th>EM600A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rubber type</td>
<td>Butadiene</td>
<td></td>
<td></td>
<td></td>
<td>Acrylic</td>
</tr>
<tr>
<td>Room temp impact</td>
<td>●●●●●</td>
<td>●●●●●</td>
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<tr>
<td>Low temp impact</td>
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<tr>
<td>Weatherability</td>
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<tr>
<td>Thermal stability</td>
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<tr>
<td>Hydrolytic stability</td>
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<td>●●</td>
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<tr>
<td>Application</td>
<td></td>
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</tr>
<tr>
<td>PC (or GF reinforced)</td>
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<td>●●</td>
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<tr>
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<td>PBT (or GF reinforced)</td>
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<td>PMMA</td>
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<tr>
<td>Transparent PMMA</td>
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<tr>
<td>PMMA/SAN</td>
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</tbody>
</table>
Impact modifier technology

Core-Shell structure

- Cross-linked rubber core
- Energy absorption
- Butadiene core
  - Tg -80°C, poor weatherability
- Acrylate core
  - Tg (-45°C), weatherability

Core

Shell

- High Tg
- Enable isolation
- Compatible with matrix
- Determine dispersion

MBS Powder

- Aggregates of a billion number of nano-sized particles

Dispersion in matrix

- Powder is dispersed into nano-sized particle during processing
- Dispersability determine the impact efficiency and surface finish.
LG’s Butadiene rubber modifiers

![Diagram showing the comparison of properties of LG’s Butadiene rubber modifiers, EM500, EM500A, and EM505. The diagram includes metrics such as low temp impact strength for PC, impact strength for PC blend, melt flow, surface gloss, heat stability, and hydrolitic stability. The EM500, EM500A, and EM505 are represented as points on the chart, with EM505 having a higher impact strength for PC blend and EM500 having better low temp impact strength for PC.]

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EM600(A) : acryl type modifier

1. EM600 : Impact modifier for Engineering Plastics
   1) Characteristics:
      - Excellent transparency for PMMA
      - Good Impact Strength and Weatherability
      - High Chemical Stability and Colorability
   2) Application: PMMA

2. EM600 Design
   Structure: Core-Shell type
   1) Core: rubber (BA/SM rubber: absorption of impact)
   2) Shell: compatibility (MMA: compatibility with Matrix)

<table>
<thead>
<tr>
<th>Structure</th>
<th>EM600(A)</th>
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<tbody>
<tr>
<td>Core</td>
<td>Rubber</td>
</tr>
<tr>
<td>- Absorption of Impact</td>
<td>BA/SM</td>
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<tr>
<td>Shell</td>
<td>Shell</td>
</tr>
<tr>
<td>- Compatibility with matrix</td>
<td>MMA</td>
</tr>
<tr>
<td>Reflex Index</td>
<td>1.486</td>
</tr>
<tr>
<td></td>
<td>(PMMA: 1.489)</td>
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</tbody>
</table>
LG’s PMMA modifiers

Comparison of properties

- Impact strength
- Transparency
- Color
- Heat stability

EM600
EM600A