Self-Stratifying Corrosion Resistant Coatings

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Inorganic/ Organic Coating

<table>
<thead>
<tr>
<th>Inorganic (Ceramic Coatings)</th>
<th>Organic (Polymer Coatings)</th>
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<tbody>
<tr>
<td>• Scratch Resistance</td>
<td>• High Toughness</td>
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<tr>
<td>• Thermal stability</td>
<td>• Flexibility</td>
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<tr>
<td>• Transparency</td>
<td>• Good Adhesion</td>
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<tr>
<td>• Durability</td>
<td>• Impact Resistance</td>
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<td>• Hardness</td>
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Hybrid Coatings
Combinations of the unique properties

Chromate Replacement

Wilkes Model Cerame Structure

Mechanism of Corrosion Prevention
**What is Stratification?**

Stratification of a Two Phase System

- **Polymer 1**
  - No interlayer boundary
  - Polymer 2

**Distinct layers of incompatible polymers**

**A gradient across the film**

**Full Phase Separation of a Two Phase System**
What Happens During Application?

Homogeneous Solution

Ready-to-spray

Polymer 1  Polymer 2  Solvent

Simultaneous Crosslinking and Solvent Evaporation

Dried film
Stratification in Multilayered Coatings

Coating A
No interlayer boundary btw A&B

Coating B
No interlayer boundary btw B&C

Coating C
No interlayer boundary btw C&D

Coating D

A concentration gradient
From A to B across the film

From B to C across the film

From C to D across the film
Producing multi-coat film structures by one-coat application

Increasing the service life of coating

Reduction of production cost

Eliminating the inter-coating boundary

Allowing considerable enhancement in coatings properties (e.g. mechanical, protective) particularly various surface/interfacial properties (e.g. mar resistance and adhesion durability)

Offering the formulators a tool to formulate mainly industrial coatings with outstanding performance
Application Fields

- Automotive Coatings
- Decorative Coatings
- Anticorrosive Paints
- Coil-Coating Technology
- Antimicrobial Coatings
- Wear-Resistant Coatings
- Marine Paints
- Heavy-Duty Coatings
- Self-Stratification