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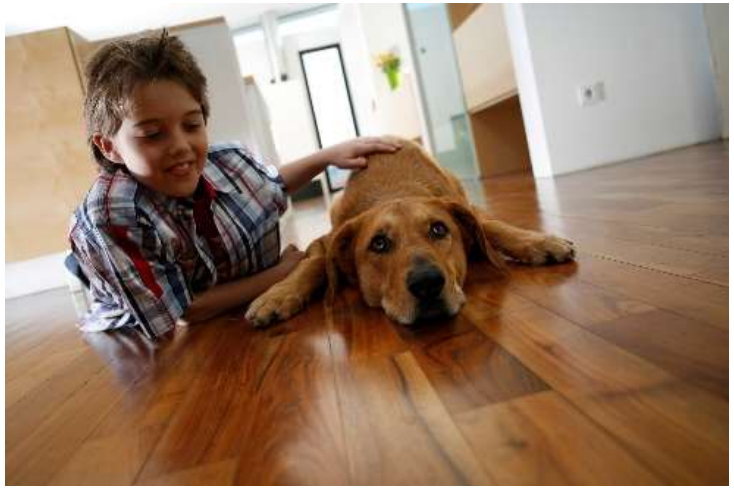
GC3 Green Chemistry Technology Showcase:

Technology Needs



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BASF – We create chemistry

We create chemistry for a sustainable future

- Our chemistry is used in almost all industries
- We combine economic success, social responsibility and environmental protection

Sales 2017	EBIT bef. SI 2017	Employees (as of Dec 31, 2017)	New patents	6 Verbund sites and 347 additional production sites worldwide
€64,475 million	€8,328 million	115,490	800 in 2017 worldwide	

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BASF's five business segments

Thirteen operating divisions

Chemicals

- Petrochemicals
- Monomers
- Intermediates

Performance Products

- Dispersions & Pigments
- Care Chemicals
- Nutrition & Health
- Performance Chemicals

Functional Materials & Solutions

- Catalysts
- Construction Chemicals
- Coatings
- Performance Materials

Agricultural Solutions

- Crop Protection

Oil & Gas

- Oil & Gas

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Chemicals – a growth industry

Global annual growth rate of ~3.6%*


Agriculture


Health & Nutrition


Energy & Resources


Construction & Housing


Consumer Goods


Automotive & Transport


Electrical & Electronics

Chemistry as enabler to meet current and future needs

… people by 2050

… of the world population will live in cities by 2050

… more primary energy consumption by 2050

… more food needed by 2050

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* Average annual real change 2017-2019; BASF Report 2016 p.121

Our Accelerators contribute to specific sustainability needs of our customers

27.2%

Cost savings downstream

Biodiversity and renewables

Climate change and energy

Emission reduction

Resource efficiency

Water

Health and safety

UN Sustainable Development Goals

Hunger and poverty*

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What BASF Needs

Additives	Antimicrobials	Coatings	Encapsulation	Mining	Packaging
Adhesives	Battery Materials	Construction	Energy and Energy Storage	Nanotechnology	Pesticides
Agro (Crop Protection)	Bio-based Chemicals	Curing	Engineering	Nutrition	Polymers and Plastics
Agro (Functional Crop Care)	Biochemistry	Dyes, Pigments, and Colorants	Health	Oil and Oilfield Solutions	Recycling and Sustainability
Agro (Plant Biotechnology)	Catalysis/ Biocatalysis	Electronics	Inorganic Chemistry	Organic Chemistry	Waste Management

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Directory

BASF Needs: Additives

- Fast-fusing sustainable plasticizers for flexible PVC applications
- Halogen Free Flame Retardants for Polyolefins / Thermoplastics
- Antioxidants with Chemical Resistance to Chlorine oxidizing in Plastics
- New Antioxidant chemistry and/or technologies beyond traditional phenols, phosphites, amines, sulfides
- Self forming barrier layers with physical resistance to Chlorine oxidizing agents in plastics
- New Light Stabilizer technologies beyond existing hindered amines; e.g. tetramethylpiperidines; piperizinones
- New Light Stabilizer technologies beyond existing UV absorbers; e.g.,hydroxylphenylbenzophenones, hydroxylphenylbenzotriazoles, hydroxylphenyltriazines; nano ZnO; nano TiO2

Directory

BASF Needs: Agro (Crop Protection)

- Technologies for better weed control
- Technologies to Simplify Weed Control (Formulations, Automation, Detections, Robotics, etc.)
- Approaches to Overcome Weed Resistance
- Tools for Farming based on Sensors for drought, heat, nutrition, data analytics
- Technologies for small farms (urban farming, developing countries, vertical farming, etc.)
- Technologies to overcome insecticide/ pesticide resistance
- All technologies for insect control beyond classical chemistries and biologicals
- Chemistries to improve water usage in agriculture (excluding irrigation systems)
- Coating to prevent crop protection formulations from drying/flaking in bulk containers, possibly super hydrophobic coating (issue with precipitates forming as water evaporates)
- Novel approaches for insect, nematode, and pest control in agriculture

Science competition example

Champion's names	Wilson Wanene (EVI) Kyle Flack (EDN)		**e-mail**	wilson.wanene@basf.com Kyle.flack@basf.com
BU	Water based paint with contact angle >100º and dodecane contact angle >100º (stain resistance for architectural coatings) a. Cost per gallon <$100 b. Organic solvent < 19 g / gallon c. Fluoro- and silicone-free Disadvantage of existing approaches: Cost Incompatibility with water-based systems			
Challenge title				
Short descript				
Why is this Ch BASF?				
Why it has not				
What's the op commercial in				
What's the su				
What customers will be impacted by working on this Challenge?		All current and future architectural coatings customers.		
Other things that are important.		A model base formulation could be provided.		

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