

# Sustainable Chemistry Technology Needs

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Technology Area	Description
<b>Adhesives</b>	Bonding agents without the use of methylene diphenyl diisocyanate (MDI) and toluene diisocyanate (TDI), generally used in paints, coatings, foams, glues, composite woods and flooring
	MEK-free primers/adhesives
	Reversible/switchable adhesives for applications, including: recycling/recovery, industrial electronics pick-and-place processes, short-term silicon wafer bonding, feet for climbing robots
	Solvent-free, water-based adhesives that do not rely on chloroprene monomer, including applications such as foam to foam, foam to polymer, foam to wood, and metal to metal capabilities in high humidity climate conditions, especially in healthcare
	Wood adhesives that do not contain added formaldehyde
<b>Battery Technologies</b>	Cobalt-free batteries that are environmentally (GreenScreen® Benchmark 2 or higher) and socially sustainable
	EGDME (1,2-dimethoxyethane)-free batteries that are GreenScreen® Benchmark 2 or higher
<b>Coating Technologies</b>	Bio-based building blocks (monomers) for resin synthesis – particularly acrylates
	Bio-based resin technologies for high physical durability coatings
	Blowing agents for wire and cable insulation without the use of azodicarbonamide (ADC).
	Coating materials with temperature dependent thermal properties
	Nano-cellulose materials with improved transparency
	Water-based resins for low temperature applications
<b>Corrosion Inhibitors</b>	Environmentally compliant alternatives to replace chromates and other heavy metals
<b>Fabric Finishes</b>	Perfluorinated and polyfluorinated compound-free (PFC-free) water and oil repellant surface treatments for footwear and textile
<b>Flame retardants</b>	Non-halogenated flame retardants for polyolefins/ thermoplastics
	Non-halogenated flame retardants that can pass the E84 and CAL133 flammability testing
<b>Fungicides</b>	Bio-inspired adjuvants for fungicides that have a benign toxicological profile
<b>Monomers/Polymers</b>	Bio-based sources of monomers/ polymers, especially for coating technologies
	Alternatives to Bisphenol A for use in the manufacture of polycarbonate and printed circuit board substrates that are GreenScreen® Benchmark 2 or higher (not Bisphenol S or Bisphenol F)
	Low toxicity cross linking agents for polymers
	Non-halogenated V-0 rated* injection molded plastics
<b>Continued on Page 2</b>	*UL94 Flammability Testing Standard and ratings

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<b>Pigments</b>	Polychlorinated Biphenyls alternatives for pigments that are GreenScreen® Benchmark 2 or higher
	Titanium Dioxide pigments with a non-toxic morphology
<b>Plasticizers</b>	Non-phthalate plasticizers for electronic products
<b>Polyurethanes</b>	Isocyanate-free polyurethanes
<b>Raw materials for formulated consumer products (including personal care and household products)</b>	Alternatives for cationic poly-electrolytes (quatery ammonium derivatives or polyquaterniums), generally used as conditioning agents for skin and/or hair cleansing products, that are biodegradable and have low ecotoxicity
	Antimicrobials and preservatives that are non-sensitizing at levels needed for preservation for personal care and household products
	Antimicrobials or technologies that are non-biocidal (do not require registration per the Biocidal Products Regulation [BPR, Regulation (EU) 528/2012])
	Biodegradable alternatives for polyacrylate-based chemistry, generally used as rheology modifiers or film formers
	Biodegradable chelating agents for personal care and household products including dishwashing and laundry detergents
	Chemistries to prepare ethanolamides without the use of ethylene oxide for improved safety
	Fragrance raw materials that are non-sensitizing with a low risk of biodiversity loss
	Hair conditioning agents that are naturally derived
	Mineral oil alternatives that are biodegradable and/or natural origin oils
	Surfactants for laundry products that can remove hydrophobic soils
	Surfactants that are amphiphilic, especially alternatives to ethoxylated materials
	Surfactants that are anaerobically biodegradable
	Surfactants that are bio-based with low aquatic toxicity
	UV Filters/ light stabilizer ingredients with low aquatic toxicity
<b>Recyclable Latex</b>	Recyclable latex for carpet backing
<b>Recycling Technologies</b>	Recycling technologies for textile blends, including those containing spandex
<b>Solvents</b>	Alternative to N-Methyl-2-Pyrrolidone (NMP) for wafer nano manufacturing applications that does not include $\gamma$ -Butyrolactone (GBL), Dimethyl Sulfoxide (DMSO), or Dimethylacetamide (DMAc)
	Solvents, especially those with applications in formulated consumer products, coatings, textiles