

## Electronic Polymers

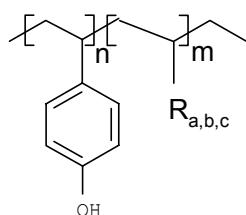
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DuPont Electronic Technologies



# PHS Copolymers PHS Terpolymers PHS "MultiPolymers"

## HIGH PURITY Electronic Grade Materials for 248 DUV Microlithography



IUPAC Names: Co/TerPolymers of 4-ethenylphenol

Since the early 1980's, EP L.P. has developed a deep expertise in free radical polymerization chemistry, and built a large portfolio of Intellectual Property in ultra-low metals resin manufacturing based on this expertise. EP is also the only commercial scale producer in the world of 4-Acetoxy styrene Monomer (ASM), the key raw material used in free radical chemistry for manufacture of resins used in 248 DUV photolithographic production of advanced semiconductor devices.

The electronic grade resins coming from this process meet the stringent demands of photoresists used in today's critical layer 248 DUV photolithography for semiconductor chip manufacturing.

Custom produced resins made from a wide variety of monomers, in combination with ASM, address the growing needs for transparency, polydispersity, acid diffusion characteristics, dissolution rate,  $T_g$ , and other factors essential

to the performance of photoresists used in critical layers of semiconductor device manufacture. Such resins are available in a wide variety of molecular weights and monomer ratios, as specified by the customer. Purified, ultra low metals content resins are available in both neat, dry powder form, or in organic solvent solutions such as PGMEA or Ethyl Lactate at solids levels up to 40 wt%.

Leveraging this chemical expertise, I/P portfolio, and captive raw material supply base, EP, operates the only North American commercial scale manufacturing facility dedicated to electronic grade resins used in resists for the 248 DUV lithographic process.

### PHS Co\Terpoly Physical Properties

Physical Appearance:	White to off-white, free flowing powder
Absorbance, 248 nm, max:	180 L/mole cm by UV
Acetoxy Residual, wt% max:	2.0 less than 0.5
Glass Transition Temp:	145 to 180 °C, depending on monomer choices.
Individual Metal <sup>(a)</sup> , ppb max:	100
Molecular Weight:	±10% from specified standard <sup>(b)</sup>
Odor:	Characteristic Phenolic
Typical Polydispersity:	1.6 to 2.2
Water, ppm max (solution):	2000
Water, wt%, max (powder):	1.5

#### Notes:

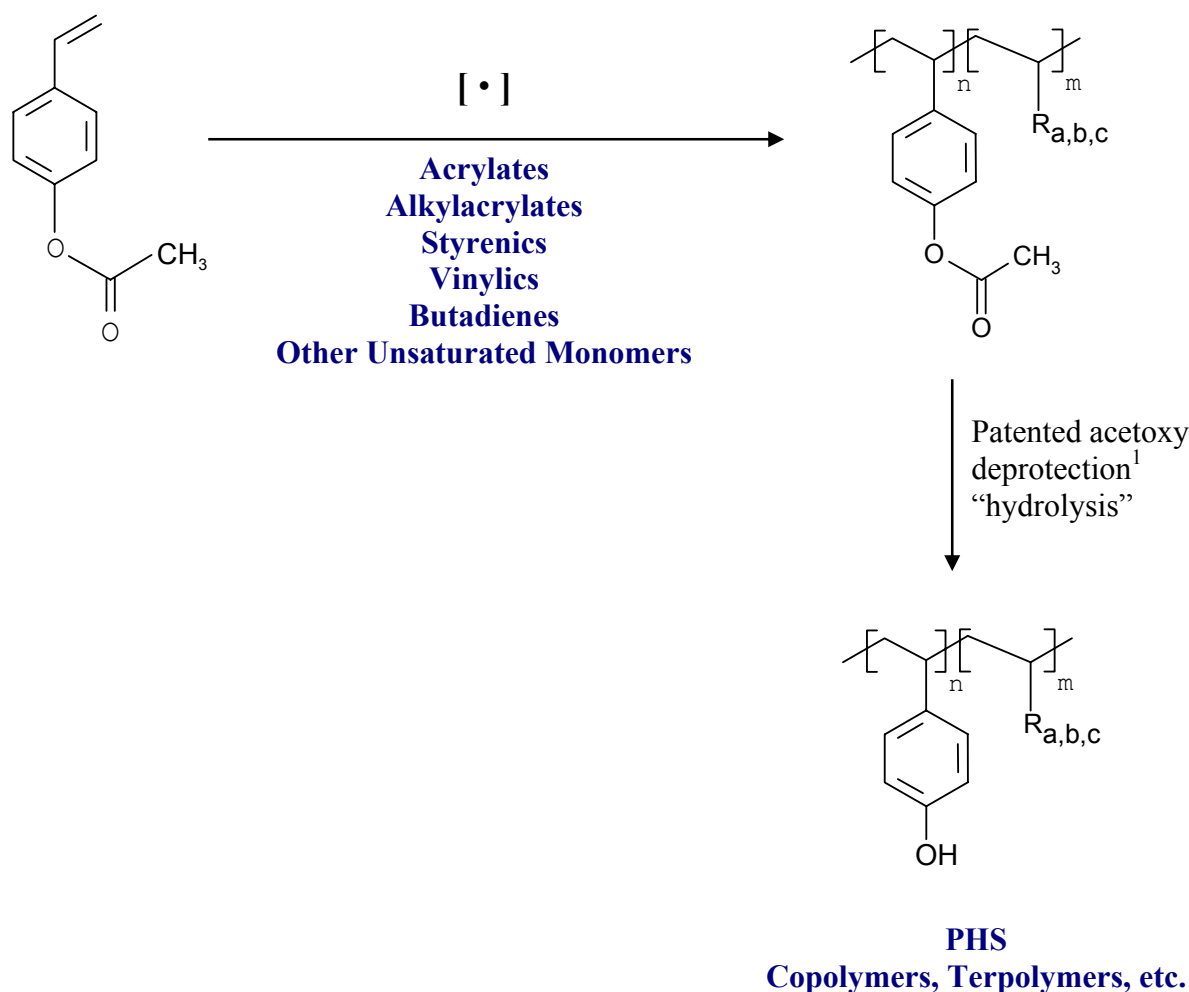
- Na, Fe, Ca, Al, K, Zn, Pb, Cu, Mn, Mg, Cr, and Ni as measured in the dry powder. Metal content of solutions available upon request.
- GPC measured molecular weight will agree within ±10% of the agreed upon internal standard

For additional information on deliveries, order placement and pricing, write or call us at our offices in Raleigh, NC at 919 248-5135, or by FAX at 919 248-5571

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# Copolymers & Terpolymers from ASM

Through Free Radical Polymerization of 4-Acetoxystyrene (ASM) and selective conversion of acetate to phenolic –OH functionality, EP can create an unlimited number of custom polymers for DUV applications.



1. EP's patented acetoxy deprotection technology allows "hydrolysis" of the acetoxy functionality, in presence of numerous acid or base sensitive functionalities without "hydrolysis" of the sensitive group.