

LEADING IN LIGHT SENSITIVE TECHNOLOGY

Yuliya Finkel gives an overview on developments in direct emulsions

Direct emulsions have been used for screen-printing for nearly 50 years and have become increasingly sophisticated because of advancements in the chemical industry, especially polymer chemistry and light-sensitive systems.

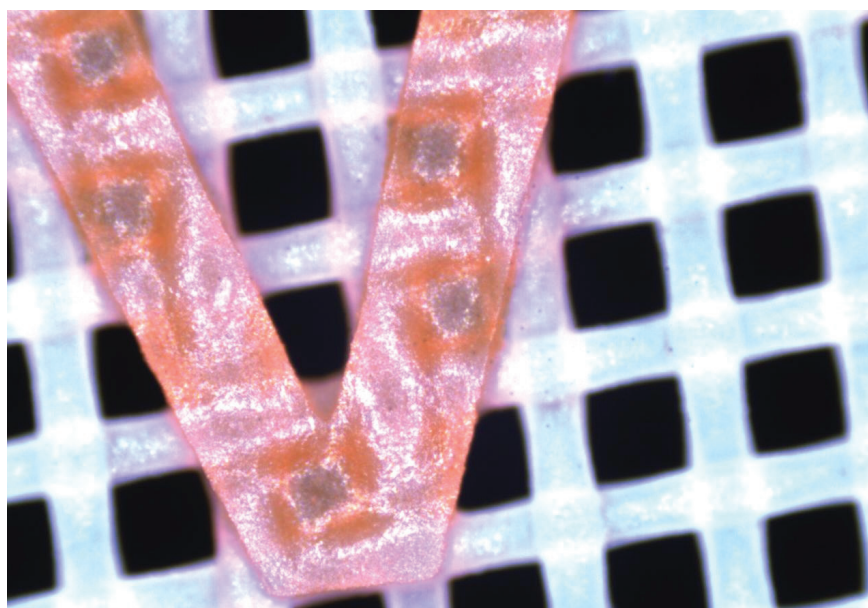
What started as bichromate-sensitised, water-based adhesives (glues) and gelatin-based indirect system stencil films, have evolved into specialised, high performance, coatings that are used in the screen-printing of LCD screens, flexible circuits, solar panels and other high precision manufactured items.

In the mid 1960s, Ulano released indirect system, gelatin-based films that did not require bichromate sensitisation. They were 'presensitised,' utilising iron salts and requiring an oxidation-reduction developing step using hydrogen peroxide. In the mid 1970s, led by Ulano, environmentally-conscious companies replaced bichromates (discovered to be carcinogenic) in direct emulsions with the light-sensitive dye that became known in the industry as diazo. Far safer to handle than bichromates, diazo offered the additional advantages of extended storage, pot and shelf life, and in some cases greater exposure latitude.

With the introduction of diazo, emulsions become more specialised, with two distinct categories becoming available – those that had high water resistance and those that had high solvent resistance. Two Ulano products became staples of the industry – 569 offered total solvent resistance and reclaimability while TZ (later superseded by 925WR) became a work-horse product for printing water-based inks, and was also reclaimable.

BREAKTHROUGHS IN THE EIGHTIES

The 1980s saw two major breakthroughs in emulsion technology. The first was associated with development of stilbazolium quaternary (SBQ) salt, an innovative, very efficient sensitizer for use with direct emulsion polymers. SBQ provided extremely fast exposure times, allowing the successful utilisation of low intensity, non-industry-specific light sources by smaller shops, and the increasing use of projection cameras for large format graphics.

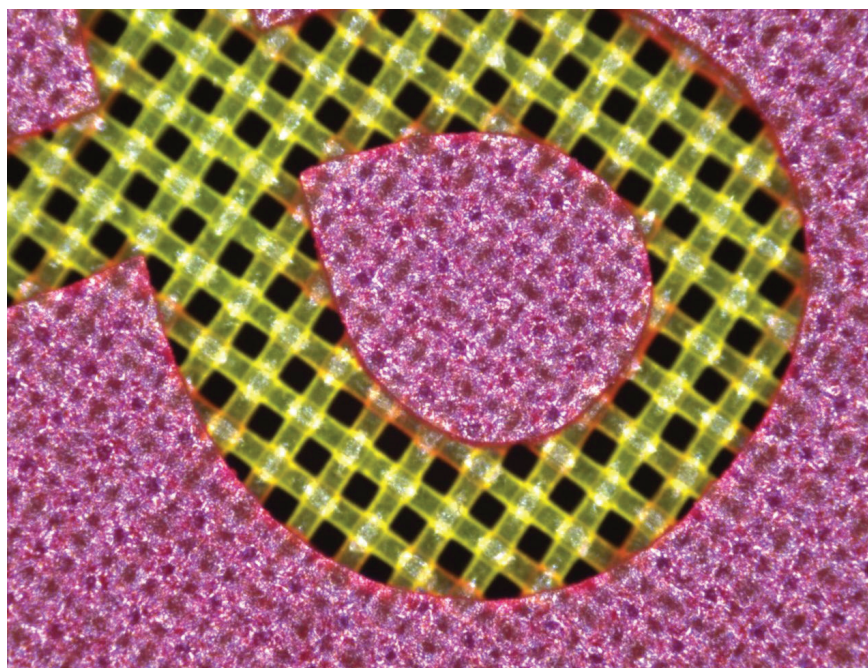


Ulano's Orange emulsion stencil swiftly became a best-seller

SBQ-based pre-sensitised emulsions lacked water resistance and offered limited solvent resistance as well. Nevertheless, SBQ quickly became the stencil technology for

plastisol printing. Ulano's QTX consequently become the product of choice for many textile printers worldwide.

Ulano continues to develop emulsions in



Ulano's highly durable QX-5 Red stencil

this category, further enhancing the performance of SBQ-based emulsions. CTS-FAST was introduced in early 2010. Like QTX, CTS-FAST became a product of choice for scanning, low intensity computer-to-screen light sources.

Innovative anti-halation technology, developed at Ulano, brought further advantages to the SBQ-based product category; with ORANGE textile emulsion becoming Ulano's best-selling product within two years of its introduction in 2012.

The second break-through in the eighties came with the commercial availability of light-sensitive acrylic resins.

The incorporation of acrylates allowed the creation of so called 'dual-cure' emulsions, in which the acrylate resin phase of the emulsion is already pre-sensitised. Added at the point of use, diazo is still responsible for sensitising the water-soluble phase of the emulsion. Dual-cure, or diazo-photopolymer, emulsion technology allowed the development of more universal, higher resolving, more durable, better imaging products that often afford equal resistance to water-based and solvent-based inks.

RLX was one of Ulano's first dual-cure products and within three years of introduction, its production reached 182 metric tons (400,000 pounds) a year. Subsequently, more specialised Ulano dual-cures – high solvent resistance Proclaim and LX-660 with its matte surface and high humidity resistance – became well-known and commercially successful products.

NO HARDENER REQUIRED

The newest product at Ulano in this category is Double-Duty emulsion. The exceptional water resistance of this emulsion allows it to be used without a hardener, yet it offers excellent reclaiming properties, along with good resistance to water-based and discharge inks. It also has superb mechanical durability and resists very acidic media.

For a decade, the choice still had to be made between limited resistance, fast SBQ-based products, or the better copying, more versatile dual-cure products that required sensitising at the point of use.

SBQ-DUAL CURES: HYBRID EMULSION

The next breakthrough in the labs came in the late 1990s and early 2000s when advances by Ulano R&D made it possible to combine both SBQ and dual-cure photochemistry in 'hybrid' technology, introduced by Ulano in its QX-1 emulsion. Hybrid emulsions are dual-cure emulsions that use SBQ instead of diazo. The longer pot life of SBQ allows the hybrids to be pre-mixed; they are pre-sensitised and ready-to-use.

The introduction of hybrid technologies alleviated many of the limitations of SBQ technology. Though slower to expose than SBQs, hybrids offer solvent resistance suitable for the graphic arts market. Exposure speed still remains fairly fast, so that hybrid

emulsions can be used in textile printing shops with low-intensity light sources or the need for rapid stencil throughput.

Hybrid emulsions at Ulano have proliferated over the years, now including the very versatile QX-5 series, which has an excellent track record with new UV-LED light scanning units.

The newly introduced fast-exposing Platinum emulsion for the textile market offers very short exposure (generally not characteristic of the hybrids), with the excellent durability of hybrids, and also features easy decoating.

A NEW PRODUCT SERIES: EC-CURE EMULSION.

Two years ago advancements in the photochemical technology of presensitising emulsion allowed Ulano to introduce another group of screen-printing products – the 'EC' or EPIC-Cure emulsions. These EPIC-Cure emulsions, utilising RD-sensitising technology, resemble dual-cure performance, with solvent and humidity resistance comparable to that of universal dual-cures. EC products, which are presensitised, do not require sensitising at the point of use and offer most of the favourable properties of dual-cure emulsions.

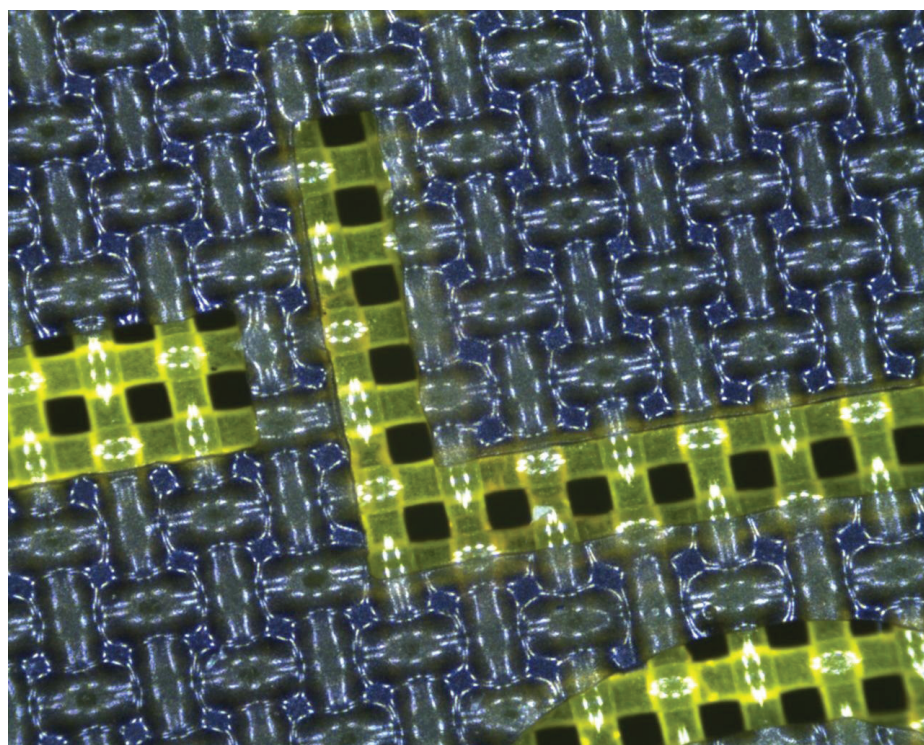
EPIC-Cure (EC) emulsions have a light sensitivity similar to SBQ-sensitised products; however, their response to light is much more precisely controlled, facilitating much better cross-linking density, copying, and resistance properties than those normally associated with SBQ-sensitised emulsions. Ulano has introduced to the market the first product of this series, Proclaim-EC, and is in the process of introducing another (now called DP-800).

Ulano has received very positive responses from the first users of EC products, commenting on how easy the process is for the stencil maker by eliminating sensitising and degassing time, and simplifying the product and process for the stencil maker. Moreover, with EC-technology, the usual problems of SBQ sensitised products – often fuzzy edges due to their very small exposure window, lower cross-linking density and associated limited resistance – are gone as well. RD-sensitising technology has, once again, allowed Ulano to create easier-to-use and better performing products. ■

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Being introduced by Ulano is its DP-800 stencil