AR NEWS

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Allresist GmbH

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Valued reader of the AR NEWS, we would like to inform you again about the further development of the Allresist and our current research projects:

1. Resist manufacturer – in the17th year after foundation – on the way to excellence

1.1 Ludwig-Erhard Award for Allresist!

Encouraged by the Berlin-Brandenburg Quality Award which we received in 2008, we applied in 2009 for the first time for the Ludwig-Erhard Award (LEP). For four days, four experienced LEP assessors evaluated the Allresist with respect to all nine criteria the EFQM model is based upon.

Shortly before our company's **17th anniversary on October 16, 2009,** the jury reached a decision: **Allresist places second in the competition for the LEP 2009 and will receive an award on November 26, 2009!**

We are extremely proud of this result in Germany's highest reputed quality competition for outstanding achievements. This award excellently confirms that we have made good progress on our way to excellence.

We received this award as a team, but also the strong bonds with our partners and customers contributed to our success. The application process as well as the assessor team's feedback provided important input for our systematic further development, bringing us a huge step closer to our vision of becoming "No 1 for innovative customized photoresists" and "World-wide established e-beam resist manufacturer".

The Allresist is thus awarded the European certificate "Recognised for Excellence" level 5.

Allresist members in September 2009 with LEP assessors

1.2 Allresist awarded with the title "Excellent Knowledge Management"

The Allresist was awarded with the title **"Excellent Knowledge Management"** as one of 25 small and medium sized enterprises in Germany and Switzerland. The award ceremony will take place on October 30, 2009 in the Federal Ministry of Economics and Technology in Berlin. Together with more than 50 competitors, Allresist was assessed with respect to a variety of evaluative dimensions:

EXZELLENTE WISSENSORGANISATION

The jury paid particular attention to a sustained knowledge use in business management, business processes and projects, as well as to the knowledge of staff members and external partners, the whole supported by a knowledge-based infrastructure. According to the jury, Allresist is especially characterised by a conscious and integrated knowledge management in all dimensions evaluated. Furthermore, solutions are innovative, pragmatic, and transferable to other companies.

Further information ☞ www.wissensexzellenz.de.

2. Product information and alternatives to removers containing NMP

On September 25, 2009 the commission regulation (EG) No 790/2009 amending EG-GHS regulation (No 1272/2008) on the classification, labelling, and packaging of substances and mixtures came into effect.

With this regulation, also the new classification of N-methyl-2-pyrrolidone (NMP) is effective now. This substance is the main component of our remover AR 300-70 and AR 300-72.

NMP is now classified as “repro-toxic“ and has to be labelled as follows:

T: Toxic

R 61: May cause harm to the unborn child.

R 36/37/38: Irritating to eyes, respiratory system, and skin.

As of now, we will mark to our products accordingly. In addition we will inform all customers who ordered products containing NMP within the last year via e-mail about the new classification and submit actualised EG safety data sheets to all customers concerned.

A new classification of NMP was announced with the 30th and 31st amendment to technical progress (ATP) to EG guideline 67/548/EWG. We therefore looked soon enough for a solution to this problem, in order to meet our own high demands with respect to social responsibility for our customers, in particular with respect to young women at universities and in companies.

We are now able to offer an adequate alternative which is harmless to health and neither generally toxic nor toxic to reproduction :

According to our investigations, N-ethyl-2-pyrrolidone (NEP) is characterized by comparable, in a few cases even higher resist removal features as compared to NMP. Due to a higher boiling point, heating of this resist is even more harmless.

Some of our major customers who currently still utilise removers containing NMP are now supplied with this new NEP remover for first test trials. After approval, our product line will successively be changed. NMP-containing removers will only be delivered until the end of this year as AR 300-70 (NMP) and 30-72 (NMP). Thereafter, these products will be removed from our product range and replaced by NEP-containing removers.

The new designation for the remover is AR 300-70 (NEP) and 300-72 (NEP), respectively.

Please contact us if you need further information.

3. Alkali-stable, patternable positive-tone photoresist - SX AR-P 3250/9

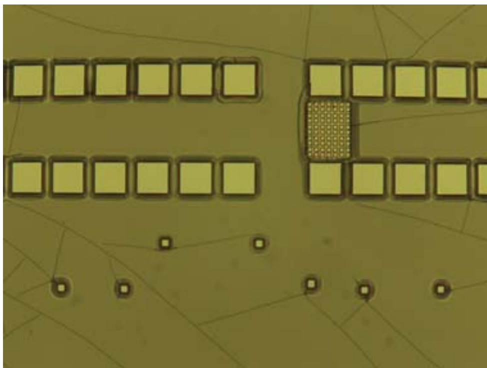
A frequent request from our customers regarding photoresists is the stability of resist structures in alkaline etching baths. With X AR-P 5900/4, Allresist offers already for a few years a resist whose structures withstand for a couple of minutes exposure to electro-plating baths with a pH of 14. So

far, X AR-P 5900/4 was mostly used as protective coating, since even though structuring is possible, the process is complicated due to the specific composition.

With the recently designed **SX AR-P 3250/9** we were able to develop an easily structurable, alkali-stable resist in cooperation with Sensitec GmbH Mainz:

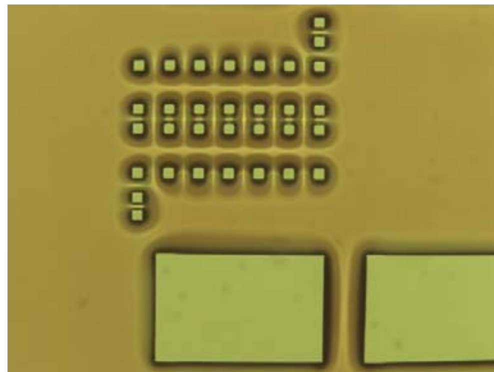
In Mainz, aluminium oxide films are etched with strong alkaline solutions. For this purpose, generally a resist of 5 µm thickness is patterned and made alkali-stable by a subsequent bake step at 130 °C. This procedure is implemented by Sensitec already for a longer time and requires a complex process management. If the temperature is too low (< 130 °C), films are not stabilised sufficiently and the etching medium will destroy certain structures (see Fig. 1). After a bake at 130 °C or higher, resist structures begin to melt and the dimensional stability is not ensured any more (see Fig. 2), removal becomes more difficult, but on the other hand resist films withstand the etching process (Fig. 3). This technological uncertainty prompted the desire to increase the reproducibility of this procedure. Experiments performed at Sensitec demonstrated that the features of our standard resists AR-P 3250 are comparable to other commercially available resists.

Figure 1



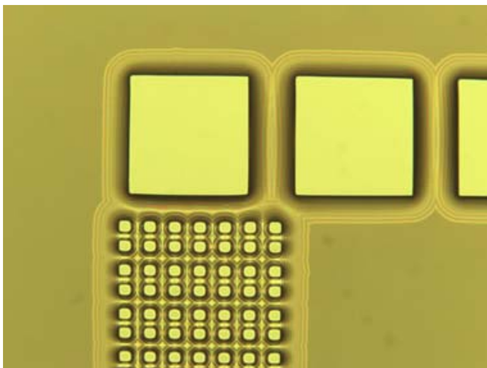
AR-P 3250 after bake at 110 °C, etched

Figure 2



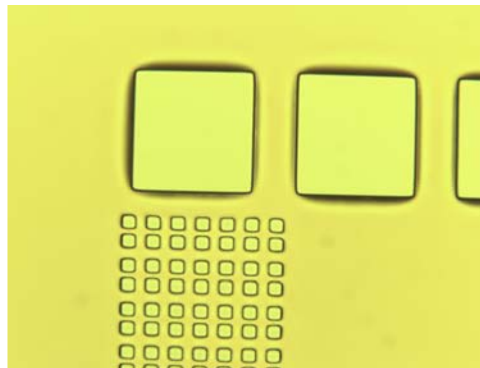
AR-P 3250 after development and bake at 130 °C

Figure 3



AR-P 3250 after development, bake at 130 °C , etched

Figure 4



SX AR-P 3250/9 after development, softbake at 105 °C

(Abb. 1 – 4: by courtesy of Sensitec GmbH Mainz)

In order to develop a simplified and safer procedure, the resist film was optimised. Our aim was to eliminate the bake step after development entirely. Therefore, further components were added to resist AR-P 3250, which lead to a substantially increased alkali resistance of resist structures during a subsequent bake step at 105 – 120 °C. It is particularly favourable that this effect occurs already during a soft bake at enhanced temperature (110 °C instead of 95 °C), thus making the second bake step unnecessary. Even under these conditions, SX AR-P 3250/9 can be easily patterned, which does however require a stronger developer. Without a bake step, structures are maintained in highest quality (Fig. 4). The etch stability is higher than for other commercially available resists after a bake at 130 °C.

With these new experimental samples, photoresist applications can be performed in a strong alkaline environment (etchings, electroplating, and others) with highest quality. For customers with similar fields of applications, resist SX AR-P 3250/9 is now available for test trials.

4. Cross-linkable polymers – new, interesting potential applications

Within the scope of our project "Development of cross-linkable epoxy-styrenes for OLED-, OFET- and micropatterning applications", new negative-tone photoresists for i-line and g-line lithography were developed. Our focus concentrates on the development of new, efficient OLED components, which are composed of different polystyrenes in a multilayer system (☞ AR NEWS 18th issue). A further field of application beyond this is the direct patterning of the respective polymers. After exposure, resist films are cross-linked according to the principle of chemical enhancement and developed in solvent development systems. First experiments showed that the application features of SX AR-N 4800/16 are already exceeded by the features of our new PMMA resists. The new resists can more easily be patterned and are characterised by a higher sensitivity. In comparison with commonly used novolak diazonaphthoquinone resins, these resist structures exhibit further, quite interesting features:

- Optical transparency at a wavelength between 300 – 900 nm
- Thermal stability up to 200 °C
- Refractive index of resist structures: 1.4 – 1.5
- Applicability as two layer system in combination with photoresists
- Alkali-resistance in strong alkaline solutions (40 % KOH)

For all users of photo lithography, these parameters offer an additional range of applications for your specific technologies. Possible fields of application are

- Transparent structures (300 – 900 nm wave length) in optical devices
- Construction of optical fibres from resist films with different refractive indices
- Patterning of surfaces which are susceptible to moisture
- Silica etching of low depth (several µm) with TMAH or
- e.g. aluminium-protection lift-off procedures for two layer systems

With this presentation of our first results we would like to stimulate your input with respect to own demands concerning these resist systems, hoping that innovative improvements for your specific processes are possible with cooperative effort.

Presenting our most recent developments in this AR NEWS issue we hope to have encouraged you and look forward to a constructive and creative cooperation.

Our next issue of the AR NEWS will again be presented in April 2010.

Successful times until then!

Strausberg, 14.10.2009

Matthias & Brigitte Schirmer

Team of Allresist