



AR NEWS

43rd issue, April 2021, Allresist GmbH



Content:

- 1. Allresist with view to the future**
- 2. Investing in novel technologies**
- 3. Structurable conductive layers**
- 4. CSAR 62 – great demand around the world**

Welcome to the 43rd issue of the AR NEWS in the unfortunately still ongoing corona-virus pandemic. We would nevertheless like to inform you about the further development of our company and its current research projects.

1. Allresist with view to the future

The new virus SARS-CoV-2 has kept us all busy in the past 14 months, and the situation is perceived by more and more people as a burden. An almost complete vaccination of the population is probably the only solution out of this crisis, and it is thus even more annoying that German policy has not exactly covered itself with glory in this respect.

We are glad that our customers report little or no economic consequences of the pandemic. At least is this indicated by an undiminished strong demand for our resists. The increased reliance on tele- or home-work in universities and research institutions is nevertheless delaying current and future projects. We can only look ahead with optimism that these time losses will be made up again. Against the background that face masks must be worn in clean rooms anyway, the mask requirement at work is at least only a minor nuisance for our customers ...

In the course of our long-term future planning, we bought the fallow neighbouring property of 2,600 m². This enables us to react calmly to the challenges of the coming years. Our steadily growing economic development and

opportunities for several interesting future projects form the basis for another company expansion.

It is a special pleasure for us as entrepreneurial couple and founders of Allresist that our children Ulrike and Oliver are now firmly integrated in the company. Ulrike has already been supporting us for 10 years and will be appointed managing director in 2024. The future is secured, especially since now five grandchildren are in the starting blocks as next generation 😊.

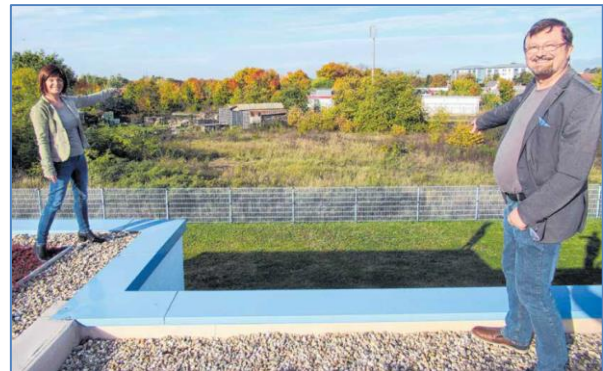


Fig. 1 Roof view at the newly acquired property behind the fence

Photo: Jens Sell, Märkisches Echo

2. Investing in novel technologies

Our conductive resist Electra 92 has meanwhile comprehensively entered the global market. The development and manufacture of the conductive polymer was (and still is!) however very demanding. After the synthesis, reconditioning by means of dialysis so far involved a deal of manual effort and required many cubic meters of deionised water.

Due to the small-scale dialysis, the guaranteed shelf life of six months was not achieved in very few cases, and the causes for this problem were clarified in intensive research.

In our search for further improvements of the technical equipment, we finally found what we had been looking for. The SARTOFLOW® Advanced system of the company Sartorius (see Fig. 2) is based on the principle of tangential flow filtration (TFF). Solutions to be extracted are tangentially passed over a membrane, while pressure is applied from above transverse to the flow direction. The desired fraction is forced through a membrane, while undesirable components remain in the solution and are released at the other end.

A 14-day test run with the standard device demonstrated its high potential. The time needed to purify a defined amount of Electra polymers was shortened by a factor of 30, and the consumption of deionised water was reduced by 80 %.

During the test phase, a few special requirements on our part occurred, and Sartorius specifically optimised the device for us.

The first small production runs last week confirmed our expectations. Electra 92 can now be produced within a short time and in large quantities with high quality.

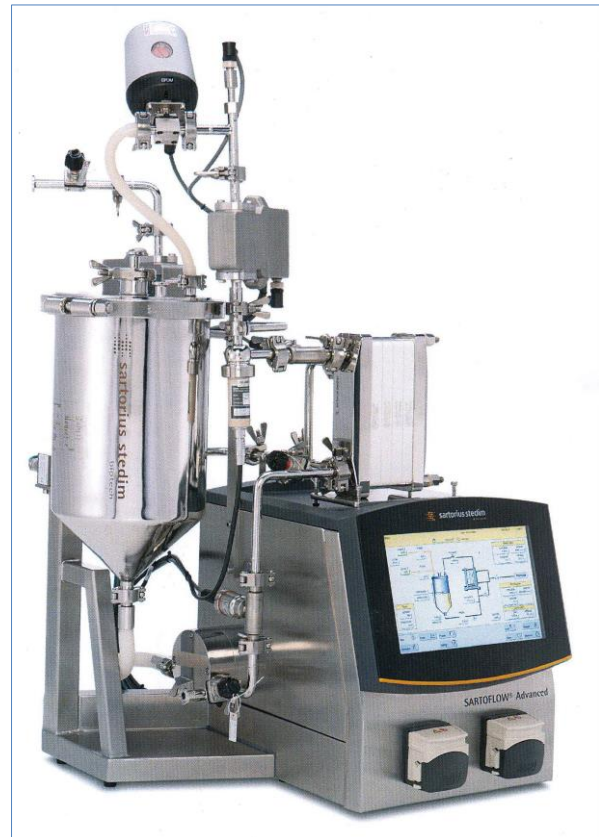


Fig. 2 Tangential Flow Filtration with Allresist-specific SARTOFLOW device

3. Structurable conductive layers

Within the scope of our Full-O-Print project to manufacture inexpensive OLEDs, we achieve some outstanding results. In the following section we present the two most important innovations:

1. It could be shown that our resists AR-P 632.09 and AR-P 662.05 can be used as a protective layer in an OLED device and have excellent properties there. Both transparent PMMA resists reliably protect the electrode layer from moisture or mechanical influences. Due to the organic solvent of the PMMA products, the dissolution of the upper electrode layer (often water-based nanoinks) can be prevented (see Fig. 3). In addition to the protective function, the performance of the OLEDs is significantly increased.

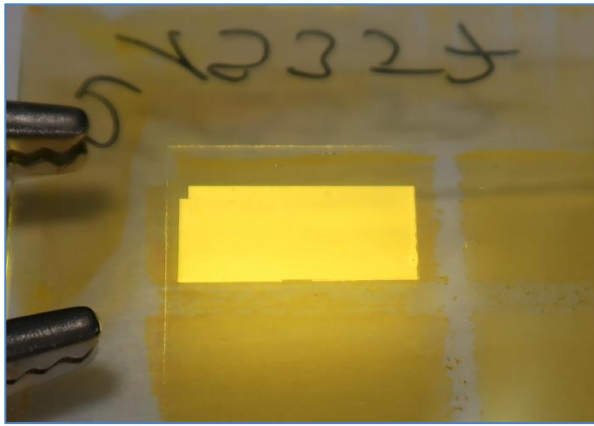


Fig. 3 Solvent-processed, transparent OLEDs on ITO glass with protective layer AR-P 632.09 (OLED size: 1 cm²)

2. The structuring of our conductive Electra 92 AR-PC 5090.02-ink and the conductive Tranductive® N-15 ink of our partner GenesInk can be performed in a simple process, and both negative and positive photoresists can be used for the structuring in a two-layer process, (see Fig. 4). In addition to the fabrication of OLEDs, also a large number of other applications are possible.



Fig. 4 Example of structured AR-PC 5090.02 (black squares, conductivity: 0.05 S/cm, developed with AR-N 4340 in a two-layer process) on a silicon wafer

The Full-O-Print project will run until spring 2022. We wanted to give potentially interested customers already now the opportunity to follow this development together with us. An interesting task for the future would for example be the fabrication of micrometer-sized conductive paths on a wafer.

4. CSAR 62 – great demand around the world

Already eight years ago, the development work on our electron beam resist CSAR 62 was completed. The market launch of CSAR 62 was fast; quickly breaking the market monopoly of the Japanese company ZEON which had up to then been the only company to offer high-quality e-beam resists. For its development and the rapid market launch, Allresist was awarded the Brandenburg Innovation Prize in 2014 (see Fig. 5).



Fig. 5 Award of the Brandenburg Innovation Prize 2014. Left: former Minister for Economic Affairs Ralf Christoffers

Resist CSAR 62 is meanwhile established worldwide, with continuously increasing demands. Since we manufacture the polymer by ourselves, we had to scale up the polymer synthesis. First of all, CSAR 62 made the jump from laboratory scale to a 20-litre batch.

After having optimised the synthesis conditions, we successfully dared the step to a 200-litre synthesis reactor (see Fig. 6). The polymerisation was successful; all required analytical parameters were met and the yield could be increased further. Currently, we have high-quality raw material for CSAR 62 for three years at our disposal, at least on the basis of the present demand. Since we signed two framework contracts for larger regular CSAR deliveries in the past month, we will now considerably push forward the next large-scale approach 😊.



Fig. 6 Allresist production facilities with 200-litre-synthesis reactor "Frida"

A prime example demonstrating the possibilities of CSAR 62 is the manufacture of T-gates with a three-layer system. The layer structure is as follows: PMMA (bottom)/AR-P 617 (middle)/CSAR 62 (top). Applying a defined irradiation regime (variation of the exposure dose), the different sensitivities are exploited to generate the desired resist geometries (see Fig. 7). After metallisation and removal, the finished T-gate is obtained (see Fig. 8).

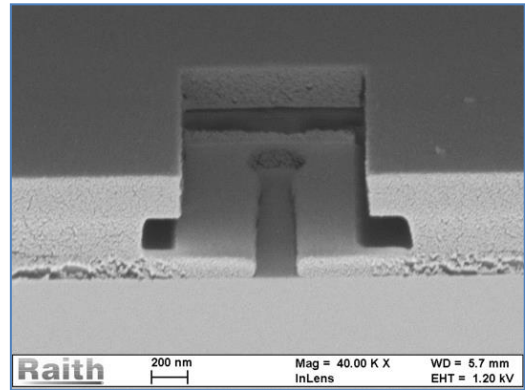


Fig. 7 Three-layer process for the fabrication of T-gates

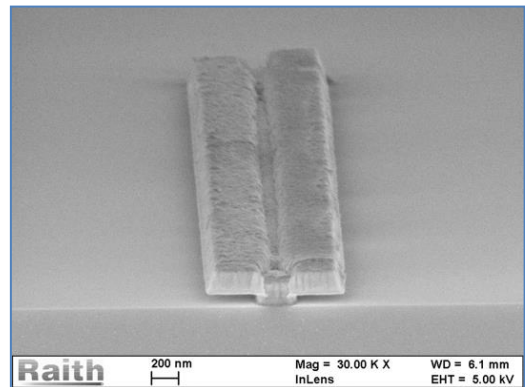


Fig. 8 Final T-gate @MLU-Halle

We hope that you found some interesting news or suggestions and look forward to your comments. The next issue of our AR NEWS will again be presented in October 2021.

Until then, we wish you and ourselves every success. Stay healthy! 😊



Strausberg, 27.04.2021
Matthias & Brigitte Schirmer in the Team of Allresist