



# AR NEWS

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Welcome to the 41st issue of the AR NEWS in the times of the coronavirus pandemic. We would nonetheless, or exactly for that reason, like to inform you about the further development of our company and the ongoing research projects.

## **1. How Allresist faces the corona crisis**

The pandemic poses unimagined problems to people, society and the economy. Public life is coming to a virtual standstill, thousands are dying from the effects of corona infections, and a still unknown number of companies will probably not survive the imminent recession.

Allresist is nevertheless well positioned to manage this crisis. Thanks to our long-term corporate strategy, we were able to build up a sufficiently large liquidity reserve that, despite a decline in sales, guarantees business operations well into the next year. We therefore need no credits or financial help and our employees will not be put on short-time work.

For you, our customers and partners, this means that we can even in these difficult times meet your requests quickly and with the usual high quality.

Three years ago we decided to set aside reserves of strategic raw materials. This was one of the reasons why we planned a company expansion in 2017/2018, which was completed on schedule and now, among others, stores these reserves. With all raw materials available in abundance, we are immune to delivery bottlenecks.

Naturally, the crisis does not leave Allresist completely unaffected. Turnover figures have decreased since especially foreign customers and universities order unavoidably less than before. However, sales are expected to rise again in a few months. We have adjusted our business plan accordingly and will conclude also this business year with a still good result.

We deeply regret that the two congresses EIPBN in New Orleans and MNE in Leuven had to be cancelled due to the corona crisis. Our new developments and results will be presented in the AR NEWS in October. Let us hope that congresses and trade fairs can be held again without restrictions next year!



Fig. 1 Bottling of hand disinfectants, photo: J. Sell

## 2. Together against Covid-19 – Low-priced delivery of disinfectants

Allresist has started a solidarity campaign to produce and supply urgently needed disinfectants. We are happy to report on these activities according to our motto "Necessity is the mother of invention and solidarity".

Allresist is a manufacturer of resists and process chemicals. In times of Covid-19, we have given some thought to the question what our contribution could be to prevent the virus from spreading.

In view of the critical shortage of disinfectants we had the idea to produce own disinfectants in accordance with the WHO-recommended formulation and on the basis of the exception approval of the BAuA (Federal Institute for Occupational Safety and Health).

Mixing high-precision formulations is one of our core competencies which enables us to manufacture disinfectants in the required high quality. We can thus help to meet the enormously increased need of medical practices, nursing facilities, schools, offices as well as companies for the protection of their employees.

Our new customers are e.g. schools in Brandenburg, the youth social network Strausberg e.V. and the municipal administrations Wriezen, Altlandsberg, and Strausberg. The city administration of Wriezen particularly thanked us in its press release for the offering of disinfectants and the quick delivery.

Our disinfectants are delivered in 5 l canisters and 200 l barrels at fair prices. This is our solidary contribution to fight corona infections and to overcome the crisis as soon as possible.

## 3. Quantum dots for the variation of LED wavelengths

So far, LEDs are not available for all wavelengths, and the efficiencies of commercial LEDs often differ widely. In the KONAMA-LED project, quantum dots should be used as colour conversion material for LEDs in order to enable designed and customer-specific wavelengths and spectral distributions. For this purpose, a highly efficient pump LED is used, the light of which is converted by the quantum dots into light with the desired wavelength. The major advantage of quantum dots lies in their variability and thus in the adjustability of the emission wavelength which only depends on the size of the quantum dots. Our goal was to produce quantum dots in such a way that they show the highest possible quantum efficiency in the encapsulation matrix and an adjustable emission in the visible wavelength range.

The KONAMA project is now drawing to a close. The partners, Signal Construct GmbH, the Fraunhofer Institute for Applied Polymer Research (IAP), OUT e.V., and Allresist GmbH are going to present the first results together. After many attempts, Allresist has succeeded in incorporating various quantum dots synthesized by Fraunhofer IAP in sufficient quantities into a PMMA matrix. These casting compounds were measured and characterized at OUT e.V., and our partner Signal Construct was able to produce the first functional samples.

Figure 2 shows the "usual" blue LED with a wavelength of 468 nm; figure 4 (left) the corresponding emission spectrum.



Fig. 2 Blue LED without casting compound with quantum dots

The quantum dot-containing PMMA was applied in several steps onto this LED and dried. After switching on, the LED shows an intense green light with a wavelength of 535 nm.

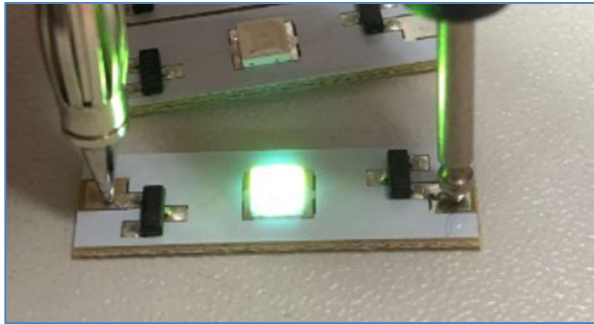


Fig. 3 LED with quantum dot-containing PMMA layer

Figure 4 illustrates the emission spectrum of the quantum dot-containing LED (right) in comparison to the original blue LED.

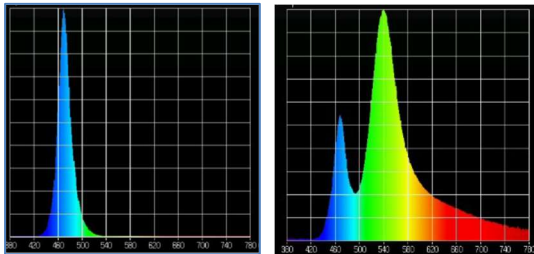


Fig. 4 Emission spectra of both LEDs

With these promising results, the project partners demonstrated that it is indeed possible to manufacture LEDs with designed, customer-specific wavelengths or spectral distributions. Available is furthermore a high level of competence in the utilisation of quantum dots also for other technologies that we would like to share with all interested parties.

#### 4. Black resist SX AR-N 8355/7, a light-tight resist that can be structured by lithography

Optically dense resists play an increasingly important role in industry. So-called black resists are required in the optical industry, the automotive industry, and in the manufacture of rotary encoders. While mainly the suppression of light reflections is intended in the optical and the automotive (headlights) industry, such resists are e.g. used directly for structuring in the manufacture of rotary encoders. Black resist SX AR-N 8355/7 was used by PWB encoders GmbH, Eisenach, for

the structuring of code disks. Figure 5 demonstrates the excellent contrast between black resist surfaces and the freely developed code disc.

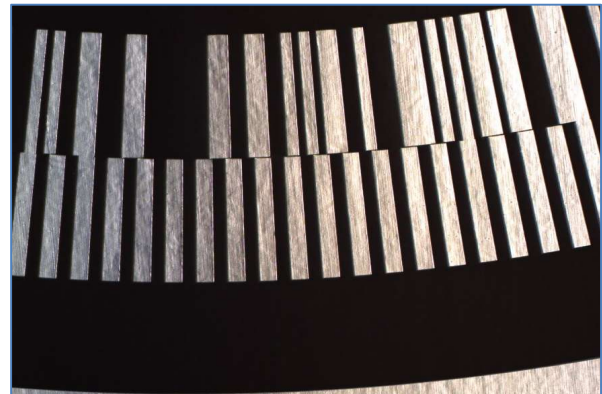


Fig. 5 Segment of a code disc, structured with black resist SX AR-N 8355/7

Meanwhile, also resists with other colours or fluorescent dyes are available. Allresist has submitted a ZIM research project concerning the development of further coloured resists, with particular emphasis on the long-term stability of these colours (> 10 years). The goal appears achievable through a use of defined nanoparticles. All interested parties are invited to submit suggestions for a joint development of tailor-made coloured resists.

#### 5. 27 years – The story of a successful collaboration with K. D. Preuß (CiS)

In February 1993, four months after the foundation of Allresist GmbH, we received an inquiry from the CiS Forschungsinstitut für Mikrosensorik (Research Institute for Micro Sensors) GmbH, Erfurt, concerning special photoresists. With the subsequent meeting in Erfurt, a long and successful cooperation began. Klaus Dieter Preuß was involved right from the start, being in charge of the technical details and development tasks. Together, our photoresists were optimised for the requirements of CiS technologies and subsequently introduced into production. We received the confidence to deliver all photoresists to this day. When a surprising problem arose in 2004 during a technology changeover which threatened to bring production to a standstill, joint investigations by Mr Schirmer and Mr Preuss were carried out

on site until the next morning. The error was finally found and quickly eliminated.



Fig. 6 Joint problem solving in the clean room

We also conducted intensive joint research work. In many projects, innovative solutions could be found that represent one of the unique selling points of the CiS in microsystems technology today.

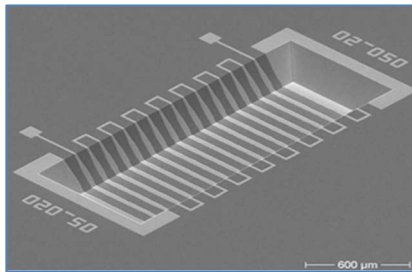


Fig. 7 Etch pits, structured with Allresist spray resist

Numerous joint meetings at trade fairs and congresses document the years of our intensive cooperation.

In March 2020 came the time when Mr. Preuss gave up his extremely committed and successful professional life and went into his well-earned retirement.



Fig. 8 Meeting on the Semicon 2010 in Dresden, K. D. Preuß and M. Schirmer (in the background: S. Völlmecke)

On this occasion, Mr. Schirmer and Dr. Gerngroß visited him in Erfurt and thanked him personally for the excellent and trustful cooperation.

In summary, Mr Preuss illustrated the enormous amounts of resist and developer supplied and processed over the past 27 years with a calculation example: 8,864 litres of AR-P 3540 in 0.5 litre beer bottles correspond to a total of 885 beer crates which would just fit on a 40 ton truck, while the 37,039 litres of developers supplied barely fit into a 40 m<sup>3</sup> tank wagon.



Fig. 9 40 ton truck and 40 m<sup>3</sup> tank wagon

We wish Mr. Preuss much joy and health in his new phase of life.

We hope that you could find a few interesting and helpful suggestions and would appreciate your feedback. The next regular issue of our AR NEWS will be presented in October 2020. Until then, we wish you and us every success. And stay healthy! 😊



Strausberg, 12.05.2020  
Matthias & Brigitte Schirmer in the Team of Allresist