



## Lightwave Logic Issues Shareholder Letter and Provides Corporate Update

ENGLEWOOD, Colo., Dec. 19, 2022 /PRNewswire/ -- Lightwave Logic, Inc. (NASDAQ: LWLG), a technology platform company leveraging its proprietary electro-optic polymers to transmit data at higher speeds with less power, today issued a letter to shareholders from its Chief Executive Officer, Dr. Michael Lebby.

Dear Fellow Shareholders,

2022 was highlighted by continued improvement and forward movement of our polymer technologies, demonstrating world record performances with our partners, running foundry process development kits (PDKs), and solidifying our intellectual property moat with issued patents with each technology enhancement. Taken together, these improvements will enable an expedited near-term path to commercialization through simplified manufacturing. At our Annual Shareholder Meeting in May 2022 we outlined a number of yearly goals and we are pleased to report that we are on-track with those goals as we enter 2023 energized and excited.

### **Commercialization Efforts with Foundries and Partners**

We achieved our goals with foundries in 2022 focusing on 'front-end' (a foundry term for chip fabrication and processing) PDKs to fabricate polymer modulators onto silicon wafers. Not only did we fabricate polymer modulators that resulted in great performance, but we are also working with our foundry partners to optimize modulator performance results. This will position us very well for our goals in 2023. In 2022 we started working with Atomic Layer Deposition (ALD) for chip-scale packaging, and this type of packaging can be completed using foundry 'back-end' (foundry term for the preparation of chips for packaging) PDKs. As noted in this update, we have moved quickly to position ourselves strongly with ALD through focused patents, as well as a recent acquisition of Chromosol's state-of-the-art ALD fabrication and deposition process. Further, we are advancing our poling techniques and processes toward full wafer poling. We are evaluating partners for wafer-based fully automated poling that will be ideal for high-volume production.

We continued working with our packaging partner in 2022 to package our polymer modulators into traditional gold-boxes for reliability testing and evaluation. This will continue into 2023 focusing on expanding our reliability data set, which is something end-users in the data-communications industry are asking us to see as a next step.

We have intensified our reliability testing and expanded our laboratory space by approximately 9,000 square feet. We continue to look for world class technical staff and have recently hired multiple PhD level lab staff to focus exclusively on reliability testing - all with the goal of expediting data sets that are needed for commercialization with end-users. We expect to have this data in hand during 2023, laying the foundation for performance demonstrations in 2023.

We have initiated working with a fiber optic transceiver partner in 2022 to explore the implementation of our polymer engine for increased performance demonstrations in 2023.

On the commercialization front, we are deepening our relationships with current partners, foundries, and end-users and we are currently in discussions regarding potential commercial agreements. In addition, we are concurrently engaged to conduct performance demonstrations and traffic trails in potential customers systems.

### **Breakthrough Results & World Record Demonstrations**

Throughout 2022 we achieved several record performances that show third party review and verification of the stability and high-temperature operation of our materials. We feel that to demonstrate that our polymers can scale and have the

potential to be ubiquitous, they need to work and operate in third party device designs, and still show world-class performance. We achieved this level of performance twice in 2022.

Firstly, we achieved world record performance for a silicon slot modulator using our advanced polymer material - all as part of our collaboration with the Karlsruhe Institute of Technology and SiOriX - clearly demonstrating that our materials can outperform in a variety of device structures and designs. This allows our platform to become a true 'green photonics' enabler for the industry. The acceptance of a post-deadline at the 2022 European Conference on Optical Communications (ECOC) provided third party validation of this significant result.

We also achieved a second world record demonstration with a 250GHz super high bandwidth electro-optical-electrical link through another partner collaboration, this time using Polariton's high-speed plasmonic modulators containing our proprietary Perkinamine<sup>®</sup> chromophores and ETH Zurich's high-speed graphene photodetectors. Our incredible result demonstrates that our electro-optic polymers will be instrumental not only for next-generation high-capacity interconnects, but for the more advanced and faster links that will be required for succeeding generations over the next couple of decades.

Early in the year we announced breakthrough photostability results on our electro-optic polymer modulators that are compatible with high-volume silicon foundry processes. Our latest polymers were subjected to rigorous optical testing and resulted in performance increases that far exceed previous polymer material designs. We then further enhanced photostability results on our proprietary electro-optic polymer modulators - demonstrating the reliability necessary for commercial deployments - all based on a technology which can be ported into high-volume silicon foundries and integrated onto a silicon photonics platform with other optical devices. These photostability results demonstrate both the compatibility with standard semiconductor manufacturing processes needed for security of supply and the high reliability needed for commercial deployments. Photostability is a metric customers ask about frequently and we are now excited with the results achieved and the impact we believe it will have with silicon foundries.

While we have not given guidance on all our technical and business achievements in 2022, these major technical based achievements reaffirm our view that our technologies are not only vastly superior in performance but are simple to implement as well - making them the right platform for next-generation optical systems for years to come.

## **Intellectual Property and Licensing**

We received strong validation of our intellectual property in 2022 with multiple new patent issuances to strengthen our portfolio. We secured a patent for a novel fabrication process to advance high-volume foundry potential that enables stable, high yielding poling of polymer devices with silicon photonics circuits. This patent is exciting from a commercial standpoint as it enables our polymers to be mass-produced using existing silicon foundry equipment, simplifying production for the foundry's we are working with. A second new patent was issued to simplify fabrication of polymer modulators designed to integrate with silicon photonics to enable enhanced internet traffic flow and reduced energy usage. A third patent on an invention that will simplify modulator integration for high-volume foundry manufacturing operations while enhancing polymer reliability to enable a more effective photonic engine was also received. We continue to file patents to strengthen our position in areas of organic chemistry, polymer device fabrication and design, and polymer device packaging.

Following up on the goals we set at our 2022 Annual Shareholder Meeting, we have received interest from several parties to license our polymer materials. As we look forward to 2023, we will continue to review the business opportunities in both licensing the use of our polymer materials as well as more deeply engage with our partners for technology transfer. We expect to see our first licensing agreement and potentially other exciting commercial updates in 2023.

Most recently, we acquired the polymer technology and intellectual property assets of Chromosol Ltd (UK) - significantly strengthening our design capabilities for 'back-end' foundry PDKs utilizing extremely low temperature atomic layer

deposition (ALD) processes that effectively hermetically seal polymer devices that have been prepared for high volume manufacturing. The ALD intellectual property acquisition will improve our back-end process PDKs and allows us to achieve state-of-the-art low temperature ALD process PDKs for chip-scale packaging of our polymer modulators.

## **Enhanced Industry & Investor Relations Presence**

In 2022, we expanded our presence at key industry and investment conferences worldwide. We were invited to present as part of the 2022 European Conference on Optical Communications (ECOC), and we were again invited to co-chair the Photonic Integrated Circuits (PIC) International Conference as well as chairing ECOC's Market and Product Focus sessions. We have also continued to participate at the global IPSR technology roadmap conferences while leading the data-communications and polymer roadmap committees. This has allowed us incredible insight over the next decade into where end-users are heading and what performance they are looking for from polymer modulator technologies. We have received numerous requests in 2022 for technical interviews, talks, as well as technical articles on our polymer technology platform, and we expect this to increase in 2023.

Throughout the year we presented at a record 7 investor conferences, highlighting our achievements to institutional investors and analysts. Awareness from institutional investors was also elevated by our inclusion in the Russell 3000® Index. Russell indexes are widely used by investment managers and institutional investors for index funds and as benchmarks for active investment strategies.

## **2023 Goals and Final Thoughts**

Looking ahead to 2023, we see a significant cadence of likely catalysts to drive forward long-term shareholder value creation. First and foremost, we expect to see our first licensing agreement for our polymers, in addition to world class performance demonstrations that we expect will show end-users that our technology is not only exciting, but will enable their business models to be more competitive for optical networking and internet system design.

There are significant additional milestones in the works that we aren't yet ready to discuss, but taken as a whole, we are incredibly confident in the direction of our business and in our team's ability to make our next-generation technologies truly ubiquitous in the global internet infrastructure of the future.

Sincerely,

Dr. Michael Lebby  
Chief Executive Officer

## **About Lightwave Logic, Inc.**

Lightwave Logic, Inc. (NASDAQ: LWLG) is developing a platform leveraging its proprietary engineered electro-optic (EO) polymers to transmit data at higher speeds with less power. The company's high-activity and high-stability organic polymers allow Lightwave Logic to create next-generation photonic EO devices, which convert data from electrical signals into optical signals, for applications in data communications and telecommunications markets. For more information, please visit the company's website at [lightwavelogic.com](https://lightwavelogic.com).

## **Safe Harbor Statement**

The information posted in this release may contain forward-looking statements within the meaning of the Private Securities Litigation Reform Act of 1995. You can identify these statements by use of the words "may," "will," "should," "plans," "explores," "expects," "anticipates," "continue," "estimate," "project," "intend," and similar expressions. Forward-looking statements involve risks and uncertainties that could cause actual results to differ materially from those projected or anticipated. These risks and uncertainties include, but are not limited to, lack of available funding; general economic and business conditions; competition from third parties; intellectual property rights of third parties; regulatory

constraints; changes in technology and methods of marketing; delays in completing various engineering and manufacturing programs; changes in customer order patterns; changes in product mix; success in technological advances and delivering technological innovations; shortages in components; production delays due to performance quality issues with outsourced components; those events and factors described by us in Item 1.A "Risk Factors" in our most recent Form 10-K and 10-Q; other risks to which our company is subject; other factors beyond the company's control.

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