To Photonics21 Secretariat
via eMail: secretariat@photonics21.org

Dear Photonics21 Secretariat,

We herewith submit the nomination of the following Photonics21 Board of Stakeholders candidate Fraunhofer IMWS / Thomas Höche.

- Letter of Nomination -
Photonics21 Board of Stakeholders
Election 2025

1. **Full legal name of the affiliation nominated as BoS Member (candidate's organisation):**

   Fraunhofer Gesellschaft, Fraunhofer Institute for Microstructure of Materials and Systems (IMWS)

2. **Full contact details of the affiliation (street, postal code, country) nominated as BoS Member and invoice address** *(In accordance with the Terms of Reference §5, which the Affiliation acknowledges having received, an Annual Service fee will be invoiced every year during the first quarter to the BoS Member. By signing the present letter, the BoS candidate agrees to pay this Membership Fee. The Fee will be considered an asset of the Photonics 21 AISBL in accordance with its statutes (article 12b).)*

   Walter-Hülse-Straße 1
   D - 06120 Halle
   Germany

3. **Name of the suggested BoS Representative (the personal candidate)**

   Prof. Dr. rer. nat. habil. Thomas Höche

4. **Information about the BoS candidate and the BoS representative**

a) Description of the activities and information about the expected contribution and value added the nominated BoS member (candidate's organisation) will bring to the BoS[1]

Research activities at *Fraunhofer IMWS* are based on its outstanding expertise in microstructure diagnostics. Being part of *Fraunhofer*, Europe's largest application-oriented research organisation, the complete range of microstructure diagnostics techniques is on disposal of 300 staff members headed by Christian Schmelzer. A huge pool of cutting-edge tools covering non-destructive testing, surface analytics, nanoanalytics, micro- and nanomechanics etc. is used to improve properties and performance of materials.
When finding root causes for failures or microstructural starting points for property improvements, we do not overstress our R&D partners with abbreviations like ToF-SIMS, XPS, SEM-FIB, XTEM, or alike. Instead, with a very solid background in their technologies, materials, and processes, we apply the best blend of tools from the microdiagnostics world to solve their inquiries and issues.

As a portfolio R&D supplier, *Fraunhofer IMWS* is serving various market segments including photonics, microelectronics, polymers, photovoltaics, medical products, hydrogen storage and transportation, to just name the most important.

[1] The candidate is aware and accepts that according to the Photonics21 Terms of Reference (§ 5 (10) a member ship fee - as determined by the General Assembly of the Association - needs to be paid to the Photonics21 association.

Microstructure diagnostics is also used to foster microstructure-based *design* of new materials. With property profiles ever getting more specific and demanding, having a close (down to atomistic) look into the microstructure lays not just the basis for knowledge-based developments but will typically accelerate the development of new materials by a factor of two.

Regarding the photonics market, *Fraunhofer IMWS* is deeply involved in microstructure diagnostics of glass and glass-ceramics substrates (featuring own processing capabilities to synthesize glasses of optical quality), multifaceted failure diagnostics of optical coatings (including EUV technologies), and the optimization of laser micromachining based on the resulting microstructure. These unique selling propositions are developed together with ca. 100 partners from the European industry. Consequently, direct contracting with industry covers more than half of the budget needed to run a growing business unit. Starting last year, we embarked significant activities related to *laser inertial fusion* regarding gentle machining of optics surfaces, heavy-duty coatings, and laser glasses.

Fraunhofer IMWS is member of several research alliances including the *Fraunhofer Cluster of Excellence Advanced Photon Sources CAPS* and the *APECS* (EU Chips Act) & *Quantum and Neuromorphic Computing* consortium of *Forschungsfabrik Mikroelektronik Deutschland FMD*, the latter being the largest cross-site R&D cooperation for micro- and nanoelectronics in Europe.

The topical expertise mentioned about, the stringent focus to exploitation of research results, the entire photonics network nurtured by Fraunhofer IMWS, and long-standing experiences in the initiation and management of large funding project constitute the added value, a striven BoS membership of Fraunhofer IMWS will bring about.

b) Description of the activities and information about expected contribution and value added the <u>BoS Representative (candidate / person)</u> will bring to the BoS.

Besides microstructure diagnostics, Thomas Höche, born in 1968 and having a background in experimental physics, is being enjoying very much to follow up

- *materials science* (during his Ph.D. at *Max Planck Institute for Metals Research* in Stuttgart and a post-doc appointment at *Otto-Schott-Institute for Glass Chemistry* in Jena, Germany),
- *crystallography* (topic of his professorial thesis at *Leipzig University*), as well as
- *laser micromachining, business development, and IP management* (at the laser-integration company *3D-Micromac AG* Chemnitz, Germany)

before joining *Fraunhofer IMWS* in 2010.

Currently, Höche is heading the department «Optical Materials and Technologies» at *Fraunhofer IMWS*, holds a professorship for experimental physics (leading the Department «Optical Materials», *Felix-Bloch-Institute for Solid State Physics* at *Leipzig University*), and serves as deputy director of *Fraunhofer IMWS*.

Beyond Höche's scientific achievements (his more than 230 peer-reviewed papers have received more than 5,500 citations), he is inventor of 69 patents and has acquired funding for research of development amounting to more than 35 Mio. € so far.

Two outstanding achievements recently accomplished in his business unit «Optical Materials and Technologies» comprise the award-winning microPREP™ (1st price, *TÜV SÜD Innovation Award 2018*) as well as the glass-ceramics LEAZit™ (1st price, *Hugo-Junkers-Preis for Research and Innovation made in Saxony Anhalt 2018*).

microPREP™, a dedicated laser tool jointly developed with *3D-Micromac AG*, has become a standard tool in semiconductor industry. LEAZit™, a novel, low thermal expansion glass ceramics based on $Sr_xBa_{1-x}Zn_2SiO_7$, has great potential to be used as an alternative, CTE-adapted substrate for reflection optics.

Höche's current research interests include novel laser glasses, laser-based fabrication of polymer-based microoptics, new processing routes for ion-beam figuring, 3D printing of ceramics, accelerated development of glasses and glass ceramics fostered by accompanying micro- and nanostructure characterization, and laser-based techniques for assembly and joining technology.

In 2022, Thomas Höche attended the last BoS meeting Brussels. The good spirit, open atmosphere, and stringency of this *photonics21* meeting passed on to him and motivated this application to become a BoS member.