



With more than 6,300 employees in research, teaching and administration and its unique profile, TU Dortmund University shapes prospects for the future: The cooperation between engineering and natural sciences as well as social and cultural studies promotes both technological innovations and progress in knowledge and methodology. And it is not only the more than 32,500 students who benefit from that.

PhD Position in Fluorine-Free Hole Transport Materials for Perovskite Solar Cells (m/w/d)

The Department of Physics at TU Dortmund University invites applications for a research assistant position (wissenschaftliche:r Mitarbeiter:in) as PhD student working on fluorine-free, chemically oxidized hole transport materials for perovskite solar cells. The position can start at the earliest possible date and does not include teaching duties. According to the public tariff regulations, the salary is based on the tariff group E13 TV-L (75%). The appointment is fixed-term for three years, with the possibility of an extension by one year.

Project Description:

Perovskite photovoltaics are among the most promising next-generation solar technologies, and the hole transport layer interfacing the perovskite absorber and the back electrode is a critical component for device efficiency, operational stability, and manufacturability. The advertised project addresses a key bottleneck in the commercialization of perovskite solar cells: state-of-the-art n-i-p devices rely on Spiro-MeOTAD doped with the fluorinated TFSI anion, which requires an additional 2D perovskite passivation layer to reach high efficiency and which adheres poorly to the metal electrode. Per- and polyfluorinated chemistry is also increasingly under regulatory and environmental scrutiny. Commercial polymeric alternatives offer superior electrode adhesion without interfacial passivation, but bring proprietary compositions and their own environmental sensitivities. You will work at the intersection of simple organic synthesis, thin-film engineering, and device physics.

You will join a newly established research group. The Grotevent Group started at the Department of Physics in April 2026 and is led by Prof. Dr. Matthias Grotevent, who holds the Wübben Foundation Professorship for Colloidal Nanomaterials. We are young, motivated, and growing fast, and our laboratories are being built up right now. You will therefore work closely with the PI on a daily basis and take ownership of your project and instrumentation early on, as the second PhD student in the group.

We offer:

A project within the Research Center Future Energy Materials and Systems (RC FEMS) of the University Alliance Ruhr; close supervision by a PI trained at ETH Zürich and MIT with industrial experience in perovskite photovoltaics; access to state-of-the-art fabrication and characterization facilities; collaboration with industry partners; support for conferences, publications, and professional development; family-friendly working conditions; and access to university sports and cultural activities.

Requirements:

- a very good master degree (120 ECTS) in chemistry, chemical engineering, physics, materials science, or a closely related discipline
- very good oral and written English skills are required; German is helpful but not mandatory
- strong motivation, creativity, and a collaborative mindset
- experience in organic synthesis, photovoltaic device fabrication, halide perovskite processing, thin-film deposition, or interface characterization is preferable but not mandatory
- familiarity with analytical techniques such as TGA, mass spectrometry, or electrochemical characterization is an advantage

Responsibilities:

Your tasks span simple organic synthesis, interface engineering, thin-film deposition, and photovoltaic device fabrication and analysis: benchmarking oxidized Spiro-MeOTAD against commercial polymeric hole transport materials at the device level, with and without a 2D perovskite passivation layer; investigating additive strategies to disentangle doping, passivation, and adhesion; synthesizing oxidized Spiro-MeOTAD with alternative, non-fluorinated anions, including anions carrying an active group for perovskite surface passivation; simplifying the synthesis towards low environmental impact, scalability, and economic viability; screening deposition solvents beyond chlorobenzene; assessing electrode adhesion of metal and carbon contacts and probing degradation pathways under open-circuit (Voc) conditions at 85 °C and 1 sun; and extending the developed materials and processes to flexible plastic substrates. You will publish in high-impact journals, file patent applications where applicable, present at conferences, and maintain good relationships with industry partners.

Techniques and methods: simple organic synthesis and purification, air-free techniques, SEM of thin films, TGA (with mass spectrometry envisaged), DSC, thin-film deposition, adhesion testing, and device efficiency and stability measurements. Collaboration with groups at TU Dortmund University is foreseen for complementary characterization.

TU Dortmund University promotes diversity and equal opportunities. We welcome applications from all qualified individuals regardless of gender, nationality, ethnic or social origin, religion, disability, age, or sexual orientation. Convince us with your personality and your professional expertise.

Applications from women are favored complying with legal regulation (North Rhine-Westphalian Equal Opportunities Act, LGG).

We also underline that applications of severely disabled persons are welcome. If you would like a disability to be taken into account, please provide suitable documentation with your application.

Applications enclosing a motivation letter, a curriculum vitae, and the contact details of two references quoting the reference number w48/26 by 01.10.2026 should be sent to:

Prof. Dr. Matthias Grotevent
TU Dortmund University
Department of Physics
Otto-Hahn-Str. 10
44227 Dortmund, Germany

For further information please do not hesitate to contact:
Prof. Dr. Matthias Grotevent (Email:
matthias.grotevent@tu-dortmund.de)