POZNAN UNIVERSITY OF TECHNOLOGY DOCTORAL SCHOOL

The result of the mid-term assessment together with the justification
Wynik oceny śródokresowej wraz z uzasadnieniem

for the period 16.11.2023 to 15.10.2025

MAHREEN AKHTAR

the doctoral student at PUT Doctoral School / doktorant Szkoły Doktorskiej PP

discipline of science / dyscyplina naukowa:
materials engineering / inżynieria materiałowa

The result of assessment / Wynik oceny

Positive / Pozytywna*	~~**Negative / Negatywna***~~

Justification / Uzasadnienie

The planned title of doctoral dissertation of Ms Mahreen Akhtar is "Material engineering for sustainable solar energy: combining organic dyes, perovskites, liquid crystals and bismuth chalcogenides". The development of lead-free hybrid perovskite materials for solar cells (the third generation) is one of the subjects of her doctoral project. The main component of the cells is the hybrid perovskites (MAI-BiXI, X = Se, S, Te, O), such as bismuth chalcohalides, which can replace toxic lead in the perovskite structure. Over the past two years, Ms Mahreen Akhtar, as part of her doctoral project, has synthesized (via solvothermal route) and characterized bismuth chalocogenides (Bi_2X_3, X = Se, S, Te, O). This concerns Task 1 which represents only 20% of the Individual Research Plan (IPB). According to the Mid-term report, the results obtained regarding the characterization of bismuth chalocogenides (Bi_2X_3, X = Se, S, Te, O) were included in a prepared manuscript submitted to the publisher.

Due to the delay in the completion of Task 2 (30% of the IPB), which concerns the synthesis of perovskites and the integration of key components, an assessment of the feasibility of completing the remaining, more complex stages of the project is necessary. Delays resulting from the implementation of the second task in an individual research plan require modifications to the ambitious plan for the entire doctoral dissertation. It is essential for the doctoral student and her supervisor to present their evaluation of how it will be possible to complete the final, mandatory tasks (such as device fabrication, characterization, and stability tests) in the remaining time until September 30, 2027, given that their completion currently seems difficult. A key element of the rescue strategy will be the presentation of a revised, realistic timeline for the entire project, focusing particularly on ensuring the successful execution and evaluation of conversion efficiency and the long-term stability of the solar cells. The supervisor should also consider incorporating additional personnel resources in the form of a co-supervisor.

Finally, the Commission concluded that after revising the IPB, the doctoral student must intensify her research activities to achieve the assumed goals of the doctoral dissertation and its completion by the deadline specified in the IPB, i.e., by September 30, 2027.

The assessment was carried out on / Ocenę przeprowadzono w dniu November 7, 2025.

On behalf of the Commission / Za Komisję

13.11.2025 r.
Date

Legible signature of Head of Commission

* delete as appropriate / niepotrzebne skreślić