

## Jury Member Report – Doctor of Philosophy thesis.

**Name of Candidate:** Ayomikun Bello

**PhD Program:** Petroleum Engineering

**Title of Thesis:** Co-optimization of the methods of oil recovery and CO<sub>2</sub> storage using nonionic-based binary surfactant foams

**Supervisor:** Professor Alexey Cheremisin

**Co-supervisor:** Dr. Anastasia Ivanova

**Name of the Reviewer:** Professor Yuri Popov

I confirm the absence of any conflict of interest Yuri Popov	<b>Date: 07-11-2024</b>
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Reviewer's Report
<p>The thesis justifies application of binary surfactant systems using experimental and computational methods of studies. CO<sub>2</sub> trapping mechanisms (residual, solubility, and mineralization) for both CO<sub>2</sub> and foam injections in relation to CO<sub>2</sub> utilization and storage are analyzed. This allowed the author to justify the most effective foaming compositions tailored for specific conditions. The reviewer evaluates the quality of the completed experimental and theoretical research work as high. The overall structure of the dissertation corresponds completely to the research program developed initially.</p> <p>The reviewer confirms that the topic of the dissertation corresponds well to its actual content. The relevance of both the experimental and theoretical methods used in the research and described in the dissertation is high and meets the requirements for PhD dissertations.</p> <p>The reviewer highly appreciates the scientific significance of the results obtained and states their compliance with the international level and modern state of the art in science and technology.</p> <p>The reviewer notes the prospects of implementing the results obtained by the author of the dissertation. This is especially true for the integration of a traditional flushing unit with a gas chromatographic unit at the outlet, which allows you to get an idea of the dynamics and composition of the extracted gas, and the novel approach to foam stability using a gas diffuser.</p>

The quality of the publications is quite sufficient for the dissertation defense.

The summary of issues to be addressed before the thesis defense is as follows:

Experimental research plays an important role in the author's work. Therefore, it is necessary to characterize the quality of the measurements carried out. Measurement accuracy, precision and uncertainty should be characterized. It is necessary to show briefly also how these estimates were done.

**Provisional Recommendation**

**X** *I recommend that the candidate should defend the thesis by means of a formal thesis defense*

