Skoltech
Skolkovo Institute of Science and Technology

Jury Member Report – Doctor of Philosophy thesis.

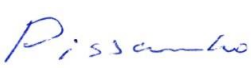
Name of Candidate: Anastasia Ivanova

PhD Program: Petroleum Engineering

Title of Thesis: Dynamic modelling and experimental evaluation of nanoparticles application in surfactant enhanced oil recovery

Supervisor: Associate Professor Alexey Cheremisin

Name of the Reviewer: Dimitri Pissarenko

I confirm the absence of any conflict of interest (Alternatively, Reviewer can formulate a possible conflict)	**Signature:**  **Date: 12-11-2020**

Reviewer's Report
The thesis manuscript presented by Anastasia Ivanova entitled "*Dynamic modelling and experimental evaluation of nanoparticles application in surfactant enhanced oil recovery"* consists of six chapters, including Introduction and Conclusions, and represents a well structured and complete account of a high quality research. The problem of enhanced oil recovery (EOR) in carbonate reservoirs is of high relevance for the modern oil industry, and the EOR related topics treated in the thesis have a direct applied value for the industry. At the same time, the presented study of physical and chemical properties of surfactants and of nanoparticle formulations, their effect on wettability and interfacial tension, as well as dependence on temperature, salinity, and other parameters represents a valuable scientific contribution. The results on nanoparticle formulations and their applications as EOR agents are novel and original, and their potential industrial applicability is illustrated in a number of publications and joint projects with the industry. The results on Molecular Dynamics (MD) simulations reported in Chapter 6 are of great interest, and to my best knowledge, direct multi-fluid simulations with surfactants of such a scale and extent are reported for the first time. Chapter 6 could probably benefit from a more detailed description and discussion related to the assumptions and limitations proper of the MD numerical simulations, along with the interpretation of the obtained modeling results.

The methodology of the research performed during the thesis project is adequate and rigorous, and the manuscript accounts for the motivation, materials, and methods in a systematic way in each chapter. Theoretical frameworks, results of modeling, and laboratory investigations are presented in a clear and well documented style. Overall, the thesis manuscript is structured and written up to the modern international standards. The candidate has published five articles in reputable international and Russian scientific journals, as well as contributed to five international scientific and industrial conference presentations. The candidate is thus fully compliant with the formal requirements of Skoltech with regard to the publications.

I am fully satisfied with the volume and quality of the work performed by the candidate in the course of the thesis project, as well as with the quality of the presented manuscript.

I confidently recommend the present thesis for the defense.

Kind regards,

Prof. Dimitri Pissarenko

Provisional Recommendation

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

☐ *I recommend that the candidate should defend the thesis by means of a formal thesis defense only after appropriate changes would be introduced in candidate's thesis according to the recommendations of the present report*

☐ *The thesis is not acceptable and I recommend that the candidate be exempt from the formal thesis defense*