# Referee Report

On PhD thesis entitled
**”Spontaneous deformation of emulsion drops undergoing phase transitions”**
For the application of **Diana Peychova Cholakova**
For the educational and scientific degree “Doctor of Philosophy” in the professional field 4.2. „Chemical sciences“ , Scientific specialty „Physical chemistry- macro kinetics“ at the Department of Chemical and Pharmaceutical Engineering- Faculty of Chemistry and Pharmacy,
Sofia University “St. Kliment Ohridsky”
**Supervisor: Prof. D.Sc. Nikolai D. Denkov**

**Written by member of the Scientific Commission** (according to document № RD-38-144/20.03.2020 )
Julia Lubomirova Genova, PhD, Associate Professor at the Institute of Solid State Physics –BAS

The submitted doctoral thesis is devoted to a research in the field of physical chemistry of colloids and interfaces, that is currently of great interest and is related to a number of modern methodologies with potential application in nano- and biotechnologies, food industry, nanomedicine and cosmetology. In particular, the author examines in detail the mechanisms of spontaneous morphological deformations of emulsion droplets of the type “oil-in-water”, stabilized by a surfactant at the water-oil interface upon cooling, as well as the factors controlling the ongoing processes: difference between chain lengths of the oil and the surfactant, cooling rate, initial droplet size, type of surfactant head group, etc. Special attention is paid to the experimental and theoretical determination of the parameters of the rotator phases formed on the surface of these systems that play a key role in the kinetics of the deformation processes and stability of the obtained objects.

The thesis is 129 pages long and contains 54 figures and 9 tables. 142 literature sources are cited. The review of the literature is exhaustive, reflects the current state of the studied problems and proves that the author is well acquainted with the research topics in the field of the thesis.

The aim of the research is clearly formulated. For its achievement a number of suitable, both experimental and theoretical tasks are set, realized by means of state-of-the-art methods such as polarization microscopy, differential scanning calorimetry, small angle X-ray scattering, theoretical modeling, etc..

The major contributions of the PhD thesis are of high degree of originality and represent an in-depth, multilateral and comprehensive study that will substantially contribute to the existing knowledge in the field.

The summary is prepared according to the requirements and includes the main results and contributions of the dissertation.

The results of the thesis are summarized in three scientific publications in renowned international journals with a high impact factor. In two of them Diana Cholakova is the first author, and in the third she is the second author, which shows her undoubted personal merit to the scientific contributions of the presented materials. Seventeen citations of the three publications included in the list of works on the topic of the thesis were noted. Research results were presented at fourteen international and national scientific forums.

**Conclusion:** The PhD thesis of Diana Cholakova contains a considerable amount of original fundamental scientific results and reveals the achievements in several highly relevant and promising scientific and applied fields. The presentation is clear and concise and well describes the defined goals and the obtained results. The PhD student has acquired in-depth theoretical knowledge and professional skills. According to me Diana Cholakova has proved her potential to formulate and solve complex scientific tasks as well as to perform investigations implementing various contemporary methods. The PhD thesis fully complies and even far exceeds the requirements of the Law for the development of the academic staff in the Republic of Bulgaria and the recommended criteria of the Faculty of chemistry and Pharmacy-Sofia University for acquiring the educational and scientific degree “doctor”.

**Considering the abovementioned I can confidently recommend to the Scientific Commission to assign to Diana Cholakova the educational and scientific degree “Doctor of Philosophy” in the professional field 4.2. Chemical Sciences, specialty „Physical chemistry- macro kinetics“.**

05.05.2020

/Assoc. Prof. Julia Genova, PhD/