


**Name of Candidate:** Maria Zhilyaeva

**PhD Program:** Materials Science and Engineering

**Title of Thesis:** A novel straightforward wet pulling technique to fabricate carbon nanotube fibers

**Supervisor:** Professor Albert Nasibulin

**Name of the Reviewer:**

I confirm the absence of any conflict of interest	 <b>Date: 17-11-2021</b>
---	--

*The purpose of this report is to obtain an independent review from the members of PhD defense Jury before the thesis defense. The members of PhD defense Jury are asked to submit signed copy of the report at least 30 days prior the thesis defense. The Reviewers are asked to bring a copy of the completed report to the thesis defense and to discuss the contents of each report with each other before the thesis defense.*

*If the reviewers have any queries about the thesis which they wish to raise in advance, please contact the Chair of the Jury.*

<b>Reviewer's Report</b>
Reviewers report should contain the following items: <ul style="list-style-type: none"><li>• Brief evaluation of the thesis quality and overall structure of the dissertation.</li><li>• The relevance of the topic of dissertation work to its actual content</li><li>• The relevance of the methods used in the dissertation</li><li>• The scientific significance of the results obtained and their compliance with the international level and current state of the art</li><li>• The relevance of the obtained results to applications (if applicable)</li><li>• The quality of publications</li></ul> The summary of issues to be addressed before/during the thesis defense

In her PhD thesis, Mariia Zhiliaeva, entitled “A novel straightforward wet pulling technique to fabricate carbon nanotube fibers”, describes Wet Pulling technique for carbon nanotube fiber fabrication, preparation of carbon nanotube thin films, study of their electrical and mechanical properties, and, then, applied for preparation of both active and passive flexible electronic components including the, the piezoresistive wet-pulled carbon nanotubes sensors.

This thesis is clearly written and well organized. It presents novel scientific results in the areas of Materials Science and Engineering. It was shown that the obtained results are of practical importance and can be applied in develop of passive and active elements of wearable electronics.

The text of PhD thesis is solid and is presented in a cohesive way. However, I have few comments to be addressed to the author for improve the quality of this PhD thesis:

1. Page 12- 16, Introduction part should be expanded or review part should be added analysis state of the art in this research field including the figures and the demonstration more clearly the gap which the author is going to fill based on results of the research in the frame of this PhD thesis;
2. Page 23, Figure 4, Please add the time unit (second, minute, etc.) for the time axis on spectrogram and audioform and name a), and b), respectively;
3. Page 32. Figure 11, RBM on Raman spectra didn't describe. Moreover, the carbon nanotube diameter can be evaluated using the following equation  $d = 224/(\omega_{\text{RBM}} - 14)$  [ M. C. Hersam, Nat. Nanotechnol. 2008, 3, 387–394, T. Jawhari, A. Roid, J. Casado, Carbon 1995, 33, 1561–1565, A. Yashchenok et al, Adv. Funct. Mater. 2010, 20, 3136–3142 ];
4. Page 63, Figure 30, please add the time unit for the time axis for all spectrograms and audioforms;
5. The author used H<sub>2</sub>AuCl<sub>4</sub> for carbon nanotube modification that can induce the gold nanoparticle growing on the carbon nanotube surface therefore I recommend to apply backscattered electron scanning electron microscopy (BSE SEM) or/and TEM for characterization of carbon nanotube surface.

After correcting some minor points mentioned above, I recommend that Maria Zhilyaeva should defend the thesis by means of a formal thesis defense.

### **Provisional Recommendation**

-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