

Review of Ph.D. thesis Ing. Ahmed Nasr with title “Study the crystallization, electroconductivity and mechanical properties in selected engineering polymers and blends”

The topic of this thesis is very interesting from scientific and application point of view. That's why many laboratories all over the world study crystallization of polymers and electrically conductive polymer composites based on carbon fibers.

The thesis is conceived as a brief theoretical introduction and commentary on the four publications that are part of it. Here I agree that hydrogen bonds give polyamides significant properties, including chemical resistance; but I do not agree with the statement that they also provide low moisture absorption. For example, PA6 at air RH of 50% has a moisture content around 2.5% and equilibrium water absorption in water is over 9%.

The experimental work aims to contribute at first to the field of crystallization influenced by the melting temperature for two engineering polymers – poly(butylene terephthalate) (PBT) and also polyamide (PA 6). I have a question about the similarity of the results for these two polymers and also about new finding compared to paper by Alfonso and Ziabicki in 1995 (Alfonso GC, Ziabicki A. Memory Effects in Isothermal Crystallization .2. Isotactic Polypropylene. Colloid and Polymer Science. 1995;273(4):317-323. <https://doi.org/10.1007/Bf00652344>). Clearly your work was inspired by these two authors, and you found something new original that deserved publication of the two papers.

The next experimental work dealt also with PBT and crystallization, this time influenced by thermal degradation. The shift of crystallization temperature towards lower temperatures due to degradation (60°C) was remarkable. However, initially the crystallization temperature increased. Please explain this very interesting phenomenon, first a small increase in T_c and then a very significant decrease in T_c . What is happening with polymer chains during thermal degradation and why did you observe such a remarkable decrease in T_m and T_c and the presence of double peak?

The last experimental work dealt with electrically conductive elastic composites based on carbon fibers. Is there an advantage of carbon fibers compared to traditional rubber fillers such as carbon black? I learned that your fibers had a very low diameter. Is there an advantage of these vapor grown fibers over normal carbon fibers or these days very popular carbon nanotubes?

The whole thesis consists of 136 pages. In the 26 pages of introduction student well explained the background and aim of the research. Then he has shown 4 papers out of which three were already published in journals listed in Web of Science.

Altogether this research was performed on high level with great number of experiments. Student has shown the ability to study literature, perform experiments, analyze experiments, and summarize them into well-arranged form.

This doctoral thesis does not contain visible flaws and therefore I recommend it for defense.

I have checked the Web of Science and found 3 papers with his name, he is listed as the first author. He already has 2 citations (without self-citation), H-Index is 1. I would say that this is enough for granting of Ph.D. title.

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