Dear Professor Djonlagić,

Please find enclosed the revised manuscript entitled: “Influence of hematite nanorods on the mechanical properties of epoxy resin” (JSCS-PM-3304). We have revised the manuscript in accord to the reviewer’s suggestions. Also, we would like to express our gratitude to the reviewers for valuable comments. All corrected or added text is marked with red throughout the manuscript.

In addition to this letter are our answers to the reviewer’s comments.

Sincerely yours,

Enis Džunuzović

Answers to the reviewer’s comments:

**Referee(s)' Comments:**

**Referee 1.**

**This article is well-written and concise. In my opinion, this manuscript should be published after minor revision and additional review.**

*1. What is the thickness of samples? Authors give cross-sectional area of 9,8-10 mm2, but it is not clear what is the thickness. It is very important especially to estimate efficiency of curing.*

Answer: The omitted value of the thickness of samples is included in the manuscript (experimental, page 4).

*2. The quality of Figure 3 must be improved, as it is very difficult to distinguish different DSC curves.*

Answer: As suggested by the Reviewer 1 the quality of the Figure 3 is improved.

*3. Decrease of Tg in polymer-matrix nano-composites is possible, but as a rule, nano-fillers increase Tg. Authors just state that the nano-fillers increase mobility, but for me it is surprising fact.*

Answer: Thorough examination of the literature indicates that incorporation of nanoparticles in polymer matrix can cause increase, decrease or does not affect the value of Tg of polymer matrix. In many papers, the decrease of Tg of polymer matrix was explained by increased polymer chains mobility although it is not experimentally proven. It has been shown experimentally that although the Tg of the nanocomposite is lower than the Tg of neat polymer, the segmental mobility of the polymer matrix chains is unchanged compared to the segmental mobility in pure polymer. Beside reduction of Tg of polymer matrix, at the same time the addition of nanoparticles accelerates physical aging process of polymer matrix. Both processes become more pronounced with the increase of the content of inorganic phase in nanocomposites, i.e. with the increase of nanoparticles surface to polymer matrix volume ratio. If the aggregation of nanoparticles is occurring in the samples with higher content of inorganic phase, these effects will be reduced. Both effects can be explained using the diffusion model. According to this model, the decrease of Tg and increase of physical aging rate is explained by the diffusion of free volume holes towards the nanoparticles-polymer interfaces.

In order to clarify this issue, besides additional references (38 and 39), proper changes in the manuscript were made (page 7).

*4. On Figure 4, as well as in the Table 1, strain at break is in the range 32-56%. It is quite surprising, as epoxy resins have usually elongation at break around 5-8 %. The resin they used is small molecular weight resin and the ratio resin: hardener is 100:32, indicating high crosslinking density. Could they explain such almost elastic behavior of normally stiff resins?*

Answer: The authors would like to thank the reviewer for noticing this issue. We agree with reviewer, it is impossible that cured epoxy resin, which has a glass transition temperature about 80 oC, has so high elongation at break. We made mistake during the calculation of strain and we apologize for that. We marked the ends of initial gage length (L0) on the examined samples before stretching (8.7- 9.0 mm, as we said on page 4 in chapter *Characterization of α-Fe2O3/epoxy nanocomposites* of unrevised version of the manuscript). Unfortunately, we did not calculate strain using the distance between the marked ends of gage length as the length of the samples (L). We used the initial distance between the grips and the distance between the grips during the test to calculate the change in gage length (ΔL) during the test. The strain was calculated using so obtained ΔL and initial gage length (L0). The initial distance between the grips is a few times bigger than the initial gage length (L0), so it is a reason why the calculated elongation at break is a few times bigger than it really is. Therefore, we recalculated the strain using the same ΔL as in previous calculation and using the initial distance between the grips as L0. We know that this calculation is not fully correct, but the mistake that is made by calculating in this way is much smaller than in the previous case.

The recalculated values of strain at break, modulus and tensile toughness are inserted in Table 1. Also, Fig. 4 is corrected and appropriated changes in the chapter Results and discussion are made (pages 8 and 9).

*5. Curing of composites is done during 21 day at room temperature. Authors should determine the amount of residual solvent in the samples (by extraction, for example).*

Answer: The authors agree with the reviewer that the examined samples contain a certain amount of residual solvent, but amount of residual solvent is not large and it does not have crucial influence on the properties of examined samples. If the amount of residual solvent was large, the glass transition temperature of examined samples should be much lower than the measured values. Also, DSC measurements were performed up to 400 K and deflection of base lines was not observed. If the amount of residual solvent was large, deflection of base line should occur due to the evaporation of solvent.

**Referee 2.**

**The manuscript 3304-16281-2-RV reports on the mechanical and thermal properties of the epoxy nanocomposites comprising α-Fe2O3 nanorods as 1D filler. It looks like a routinely written paper not paying much attention to important details. It can be published only after revision.**

*p. 2: Are epoxy resins really of low cost?*

Answer: If we compare the price of epoxy resin and price of other resins, the epoxy resin is not low cost, but if we take in account price, properties and durability, using the epoxy resin is most cost effective than other resins. Thus, in order to avoid misunderstanding the first sentence in Introduction is changed.

*p. 2: Nothing is mentioned about possible benefits or shortcomings for polymeric nanocomposites by using 1D fillers, i.e. nanorods, instead of spherical nanoparticles. Can you hypothesize that?*

Answer: Incorporation of nanorods into polymer matrix can improve mechanical properties of polymer matrix that can’t be achieved using the same amount of spherical nano-filler. This effect is becoming more pronounced with the increase of the aspect ratio of rod-like nano-fillers. Except mechanical properties, the use of nanorods instead of spherical nano-fillers offers many advantages in terms of optical properties and conductivity of polymer nanocomposites.

In order to clarify this issue besides additional references (10-12), proper changes in the manuscript were made (page 2).

*pp. 2, 9 and 10: Clarify dimensionality of nanorods! See e.g. the paper in Progress in Materials Science 57 (2012) 724–803.*

Answer: In accordance to reviewer’s suggestions the dimensionality of nanospheres (0D) and nanorods (1D) is clarified. Also, reference suggested by the Reviewer 2 is included in the manuscript (reference 25).

*p. 2: What was the real aim of using magnetic nanorods for epoxy nanocomposites – which are the potential applications (having in mind that iron oxides can act as catalysts)?*

Answer: The main strategy for preparation of nanocomposites with improved mechanical properties is to keep as low as possible content of inorganic phase. Our intention was to show that improvement of mechanical properties of the epoxy resin can be achieved using small concentration of rod-like nano-fillers, smaller than 1.0 wt.-%. The used filler is hematite (α-Fe2O3), prepared by procedure (described in reference 35) which is similar to the procedure developed by Professor Metijević (reference 37). Magnetic properties of α-Fe2O3 nanoparticles prepared using synthetic procedures developed by Professor Matijević has been well documented in literature (see for example: T.P. Raming, A.J.A. Winnubst, C.M. van Kats, A.P. Philipse, “*The Synthesis and Magnetic Properties of Nanosized Hematite (α-Fe2O3) Particles*”, J. Colloid Interface Sci., **249,** 346–350 (2002)). It has been shown that the α-Fe2O3 has weakly ferromagnetic or superparamagnetic behavior depending on particle size. These nanocomposites could find potential application in the protective coatings industry. The barrier properties of epoxy coatings are improved by incorporation of α-Fe2O3 nanofiller. α-Fe2O3 exhibit high corrosion resistance and in combination with polyaniline can be used as pigment in anticorrosive coatings.

*Pp. 2, 6 and 7: The authors should cite and compare the results given in the paper of D. Dudić, M. Marinović-Cincović, J. M. Nedeljković and V. Djoković in Polymer 49 (2008) 4000-4008. The paper reports on the electrical properties of a nanocomposite comprising epoxy resin and (2 wt.%) α-hematite nanorods, but also gives comments on Tg values and morphology of the fracture surfaces.*

Answer: In accordance to reviewer’s suggestions the authors cite (reference 40) and compare the obtained results with the results given in the paper of Dudić and co-workers (pages 7 and 8).

*pp. 7 and 8: Please correct the legend (decimal dot instead of comma) in Figs. 3 and 4*

*General: Please once more read the text carefully and correct the English language where appropriate (e.g. page 9: According to obtain results, the likely…)*

Answer: Figures 3 and 4 are corrected in accordance to the reviewer’s suggestions. Also, language was corrected by the native English speaker.