Response to Reviewer 1 Comments

Point 1: Authors should clearly define what they measure and which processes underline the measured values. For example, Fig. 5 shows the data of CCK-8 assay. This assay is based on the measurements of cell mitochondrial activity and reflects both cell viability and proliferation. The data cannot be interpreted as "Cell metabolic activity and proliferation", because these two factors cannot be separated and using of this term might mislead the readers.

Response 1:
Thank you, we agree that the heading "Cell metabolic activity and proliferation" is misleading, implying two different performed tests.
In the original manuscript, in results section 3.5 we had already pointed out that we determined metabolic activity as a measure for cell proliferation: "To determine the effect of FFF printing structures and surface roughness on the growth of human osteoblasts, we used the CCK-8 assay to examine cell metabolic activity as an indirect measurement of cell proliferation (Figure 5)" (grey colour).
To make this clear from the beginning, we now denominated the methods and results sections dealing with the CCK-8 assay as "Proliferation assay", and added a half sentence for explanation also to the methods section 2.4.3 (grey colour): "(CCK-8) labeling reagent (Dojindo Molecular Technologies, Inc., Rockville, MD, USA) was added to determine the mitochondrial dehydrogenase activity as a measure for proliferation of the SAOS-2 cells." We are aware of course, that this relation is only valid if the cells have comparable metabolic activity.

Point 2: Measurements of cell coverage (Fig. 6). The use of this term is also controversial. According to the applied procedure, cells were fixed and stained after some period of culture, and the amount of stained color was quantified. Thus, the intensity of color should be proportional to the number of the cells and thus reflect cell proliferation.

Response 2: Thank you for pointing this term out. You are right, the eluted colour is proportional to the cell number, however, since we do not quantify the number, we use "density of the cell layer "or "cell surface coverage" as the determined parameter.
As you mention, basically the cell density is the result of cell proliferation in the last five days, however, it is not identical to the proliferation determined by CCK-8 test. The results can be quite different. The CCK-8 test may indicate a slower proliferation rate of cells on a certain surface compared to others, while in the cell density test it becomes obvious that an already complete surface coverage has led to contact inhibition and thus, lower activity of the cells on this surface. We therefore use both tests.
To avoid confusion for the reader we tried to use consistently the terms "proliferation" for the CCK-8 based activity measurement and "cell density" or "surface coverage" for the cell layer staining by crystal violet in the revised manuscript.

Point 3: The differences in Ra parameter between polished and grit-blasted surfaces are rather small. Moreover, Ra values of grit-blasted surfaces are markedly lower compared to those of commercially available Ti implants. This fact should be considered in Discussion.

Response 3: Thank you for your suggestion. It is rather difficult to compare published rougness values. Values are dependent on the applied method (optical, profilometer etc.), the

sensed surface area and the applied Gaussian filters. Furthermore, values are published based on 2D- and 3D-roughness analyses. We discussed these issues now in the revised second paragraph of the Discussion part (blue colour).

Point 4: Ra parameter of untreated PEEK discs was pretty high (22.28 µm). It means that the dimension of the hills and the valleys on this surface is similar to the cell size. This parameter does not really reflect biologically relevant surface microstructure. It is known that cell behavior is influenced by moderately rough surfaces with Ra in the range up to 4 µm. However, surface with so high Ra values will influence cell growth by other mechanisms. Moreover, such high roughness values suggest much larger surface area, and this might account better proliferation observed for this surface.

Response 4: Thank you for your comment. Actually, roughness is a relative measure and depends on the applied filter, that separates roughness from waviness. By the settings as used in this study, indeed, the roughness is very high on the untreated samples compared to the treated ones. Strictly spoken, the untreated samples nearly show a macroroughness, whereas the other samples show typical microroughness. According to your suggestion, we have changed this part in the Discussion section (pink colour). We deleted some sentences which related to the biologically relevant surface roughness of the as-printed modification and emphasized the influence of enlarged surface.