Dear Editor,

I do not agree with the conclusions that you reached about our paper and I'm quite sorry too as the pressure, you evidently had about our paper, determined this decision despite the experimental evidence of our work. Consequently, I do not agree with the retraction of our paper and I think that, if there are objections to our work, these should be published on Plos One, giving us the possibility to answer specifically to the concerns and giving to the audience of the journal the possibility to follow the different positions. Before to answer into the specific points raised in your letter, I would like to mark that, of course, our work had not the intention to demonstrated that the Turin's shroud was the veil wrapping the body of Christ, but it is an accurate series of original experiments, that I personally performed, whose unexpected results were published on Plos One after a long referee's analysis of several months. Let me add, at this point, shortly, my personal experience with this experiment on the shroud, because I think it could be of some interest regarding the way that I believe should be followed in a scientific research. When I started the experiments, my main point was to check if the method I developed few years in advance was applicable to a specimen made of an old linen fiber and if it was possible to analyze such a specimen by high energy electrons without any of the pre-treatments that usually are applied to low atomic number beam sensitive specimens. My expectation was to find eventually the clues of the presence of blood or ink or both. Really nothing of so relevant. Due to the use of an atomic resolution TEM, it was a nonsense for me to investigate the large spots visible by optical microscopy but I focused my attention in the areas where the fiber appears free of any microscopic spots, to eventually investigate something that certainly was not investigated previously. It was quite a surprise for me to be able to see in these "clean" areas the presence of thousands of nanoparticles that at that time were for me completely unknown. The particles were well dispersed on the fiber and did not tend to aggregate. As reported in the references of the paper, dye for painting or ink tend to aggregate and I did not observe any aggregation away from the large spots visible by optical microscopy. This aspect is even more relevant if we consider, as I learned later, the presence of particles of iron oxides of few nanometers that has a particular tendency to aggregation and coalescence. I'm a physicist, and to try to understand the possible nature of the nanoparticles seen in the fiber I showed the micrographs to some biologists that told me that the shape of the particles resembled to ferritin. This was reasonable for me and also in line with my expectations. Hence, I compared the experimental diffractograms with the diffractograms computed by using the known structure of the ferritin but the results did not match at all. Only the small dark particles inside the low atomic number envelop were very similar to the iron oxide particles of the ferritin but without an important fingerprint spacing at 0.25 nm. At that point my idea was: "ok, this is an old sample, there are perhaps some spots of blood and I detected the presence of particles of ferritin whose organic and inorganic components were degraded during the centuries due to the exposure to the environment". This idea was certainly reasonable and in line with my initial expectation about the Turin shroud. Nevertheless, I think that a scientist should do something more than that and he should not settle for something that looks reasonable and in line with his expectations without finding further evidences and references about the solution without prejudices. This is why our work kept going studying also subjects related to old dyes for painting, old pigments for ink, iron oxides, proteins, medicine, bio-medicine, bio-engineering etc.

and some of these subjects were not familiar to our education and field of research. It was during that research that we learned that some researchers, in a totally different contest and with totally different aims, studied iron oxide nanoparticles and their possible use for an efficient blood cleaning machine for people with acute kidney disease and, more generally, dealing with hemodialysis. To demonstrate the capability of iron oxide to bind to the waste of the blood, they showed in their work the x-ray diffraction spectra of iron-oxide bounded to urea and creatinine, in comparison with iron oxide reference, and we immediately recognize the absence of the 0.25 nm line, typical of iron oxide, in the bounded nanoparticles. This is the same spacing that I did not find in my experiments. This result induced me, as reported in the published paper, to compare the experimental diffractograms of our nanoparticles with those simulated by using the known structures of creatinine and urea, and in all of the results I obtained that the experimental results were compatible with creatinine. No experimental diffractograms were compatible with the simulation with urea. This result was completed unexpected and all the elements, when I re-checked the experimental data, were in agreement with the finding that the nanoparticles we observed were made of creatinine bound to small nanoparticles of iron oxide typical of the inorganic component of ferritin. These two components do not meet in a healthy human, or if you prefer animal organism, but they require the breaking of the blood cells and the release of the content in the blood stream. This happen in an organism under strong stress, as occurs in case a strong polytrauma, where also is reported a high production of creatinine. The presence of iron particles bound to creatinine in the blood is highly toxic and induce an acute kidney disease syndrome and this is why many persons involved in strong accidents, for example by cars or moto vehicles, die for acute kidney disease. Also this is widely reported in literature. Should we think that a fraudulent imagine was realized in the Middle Ages, or later, by someone that used the blood serum of a tortured person, or animal, with a severe acute kidney syndrome to realize the perfect fake that would have been studied by a new atomic resolution TEM method some hundreds of years after? Why simply he did not use the serum of a person, or an animal, killed without extended torture. This scenario definitely looks to me highly unlikely. In our paper we do not say anything about the date of the shroud, our results state that the shroud was not painted and, on the fiber, there are the evidences of the blood serum of a person who suffered for a strong polytrauma. Of course, could also be the serum of a tortured animal but this again call into question the presence of a prescient fraudulent artist committed to prepare the fake for the future, and this is not something that I consider likely. If this result is so strongly attacked this definitely looks to me originated by a non-scientific bias. Now let me spend few words about the validity of the results as we studied a single particle of the fabric. All TEM experiments done all over the world are not done on macroscopic volumes; what it is always important is that the specimen has to be representative of the material under study and that the experiment has to be performed on hundreds of areas of the specimen to have a result significant in terms of statistic. Definitely, it is a nonsense that a single small fiber of the fabric was wet by the serum of a dead person with severe kidney problems and that in the veil there are no other fibers wet by this serum. It is also hard to think that someone, with a severe kidney problem and close to the end of his life, with the hands covered by his blood serum touched by accident the shroud (or a single millimetric fiber of the shroud). Of course, our experiments cannot say who this person is and when he was draped in the veil. According to the work on the

carbon 14 the veil is of the Middle Ages, well, this is not the subject in our paper. As far as the statistic of the experiments concerns, we performed hundreds of TEM experiments, as usual in accurate TEM experiments, on different particles of the fiber indexing different zone axes of the creatinine, as shown in the published materials on Plos One. The experiments are reproducible, STERA has some fibers and the Turin Shroud is property of the Vatican, those interested should ask the specimen to them. Furthermore, the fiber we studied, as we used a TEM low dose method that investigated the fiber without pre-treatments, is also available for further not destructive experiments. You complain that we did not reported the eventual conflict of interest of STERA. We reported that the specimen was provided by STERA in more than one part of the paper, we did not report in the conflict of interest section simply because STERA did not give any contributions about the experiments, their interpretation and the writing of the paper. If you wish we can add a suitable declaration also in the “conflict of interest statement” adding it as an erratum of the paper. I hope that we can discuss on the scientific results not about prejudices.