**Dear Joerg,**

First I hope that you and your family had a good start of the new year and will continue to have a healthy, wonderful, and successful year.

First I would like to thank you again for your e-mail concerning our paper with the comments of the reviewers. After careful consideration on the comments of both reviewers (particularly, Reviewer #2), we have reached a conclusion that we will be able to refute the criticisms in a clear manner and convince the Reviewers of that structural order we found in colloidal suspensions is nothing to do with trivial crystallization. We also explain why we believe that our paper has a broad impact on glass transition of various materials.

Here we quote your summary of the comments of the reviewers.

“**The referee comments are relatively clear and need little amplification from me. Referee 2 in particular raises a number of strong concerns on the paper, and the strength of the conclusions. Furthermore, this reviewer also asserts that even if it were possible to address these concerns, the paper may be better suitable for a more specific journal. Indeed, the generality of your observations might be impossible to assess at this stage. Such views are complemented by comments made by reviewer 3 who comments that this basically is an extension of previous work, which does not unravel new details on the link between local structure and dynamics - but of course rather represents a more specific advance. And even though this reviewer is more positive overall, in light of such broader reservations from both reviewers, and given the high competition for space in our journal, we sadly must conclude that this study does not warrant publication in Nature Materials but would find a better outlet in a more specialised journal.”**

First of all, we would like to emphasize that the major criticism of Reviewer #2 is based on his or her misunderstanding. As shown below and also in Supplementary Information newly added, our crystal-like bond orientational order is nothing to do with ‘trivial’ crystallization. We estimate that the number of particles forming crystals (whose size is much smaller than the critical nucleus size and thus which appear just as fluctuations!) is the order of 1% of the total particles or less. We think that these crystals should be regarded as the extreme of bond order parameter fluctuations. They can hardly affect the dynamics. We strongly believe and are afraid that most of the criticisms of Reviewer #2 come from this crucial misunderstanding. This has now been clearly described in the revised manuscript and Supplementary Information.

We very much worry about the following statement of Reviewer #2: “**The latter may be unexpected for some, but, if true, the former suggests that the glass problem is really one of hidden (micro-) crystallization, which would be of broad interest for the glass-forming and materials science communities. There are, however, possibly serious flaws in the analysis, which cast a doubt on this interpretation. Note that it is not clear whether a revised version that takes account of these problems would have the impact expected of Nature Materials publications. ”**

The Reviewer #2 obviously mixed up "crystal-like bond orientational order (liquid with temporal structural order)" and "real crystal (solid)". I am afraid that his or her final statement on the suitability of our paper is significantly affected by this misunderstanding.

We believe that as pointed out by Reviewer #2, which of icosahedral, amorphous, or crystal-like order plays an essential role in glassy slow dynamics lies at the heart of the long-standing fundamental issue of glass transition. The importance of icosahedral order, which was first pointed out by Frank in his seminal paper published in 1952, and further developed by Nelson, Sadoc, and Tarjus and their coworkers and many others. This idea and internal frustration hidden in this type order have continued to be the central dogma of glass transition and the basis of spin-glass approaches (see the first paragraph in page 3 of our manuscript). These ideas are the basis of currently popular major theoretical approaches to glass transition, as can be seen in recent review articles, Refs. [1] and [2].

We also emphasize that our structural analysis becomes possible by our novel particle tracking method, which allows us to extract not only the coordinate but also the size of a particle, which is impossible by previous methods. Following the kind comment of Reviewer #2, we have decided to include a brief description of this novel method and its power in Supplementary Information. We believe this raises the impact of our paper as an experimental paper.

We also note that a recent work by Charbonneau et al. (just published in Phys. Rev. Lett.), which was requested by Reviewer #2 to cite, claims that there is no static growing length in supercooled liquids including polydisperse hard spheres (8.5% polydispersity). This is at odds with our finding. It is the major current issue in the glass transition physics whether there is a growing static length or not. We show convincing 'experimental' evidence for the presence of such static order in 3D typical glass formers for the first time. We believe that this would contribute to our understanding on the role of static order in glassy slow dynamics.

We made more explicit our analysis of the icosahedral percolation into the Supplementary information, to show much clearer that icosahedral ordering is not relevant to slow glassy dynamics.

Could you also see our Rebbutal Letter on the details of our responses to the Reviewers’ comments? We believe that the revisions made following the valuable comments of Reviewers have made the physical message of our paper much clearer and more convincing. Thus, I think that the comments of both Reviewers were very useful and helpful for improving our paper.

Now I would like to mention a possible impact of our paper on materials science.

Our work unambiguously demonstrates that neither icosahedral nor amorphous order is the main player of glassy slow dynamics, although the former may still play an important role in avoiding crystallization. This is a very original and new finding that is ‘not’ on the line of our previous works. Furthermore, our work also demonstrates that it is crystal-like 'medium range' bond orientational order that is responsible for glassy slow dynamics, at least for our colloidal systems. This suggests the importance of medium-range structural correlation in slow dynamics and that the cage-based picture such as mode-coupling theory cannot explain glassy slow dynamics. That is, slow dynamics is a consequence of medium-range coherence of particle motion and not a result of single-particle-level caging. This picture also explains why ‘short-range’ icosahedral order cannot play a major role in slowing down of the dynamics. This is one of the major findings of our work. These findings may be very useful to judge which theoretical scenario is relevant to the origin of slow glassy dynamics.

We also emphasize that this work provides the first 'experimental' confirmation of the importance of crystal-like medium-range order in three dimensional model glass formers. These findings may be relevant not only to colloidal systems, but also metallic glasses and many other systems. In particular, metallic glasses share many common features with colloidal glasses because of the nearly spherically symmetric interactions between atoms (although covalency sometimes plays a role). Thus, what is found here should apply to metallic glasses. To support this claim, we have added one sentence in the conclusion with a new reference [34], which I sent you when I communicated with you before the formal submission. Furthermore, I recently met Matthias Wuttig (Aachen Univ.) who is famous for phase change memory and we share a common impression that this scenario may also be relevant to chalcogenide glasses and phase change materials. For example, I learned that fast phase change materials have a liquid structure having some similarity to its crystalline structure. This may be explained by our scenario. We have added a brief description on these two types of materials with the relevant references [34,36] in the conclusion of our manuscript. Because of these reasons, we believe that our paper may have an impact in materials science, which is expected for Nature Materials.

We sincerely hope that you would find that our revised paper has an impact large enough to warrant publication in Nature Materials.

**Sincerely yours,**

**Hajime Tanaka**

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