Response to Reviewer 1 Comments

Dear Editors and Reviewers,

We would like to thank you for your careful reading, helpful comments and constructive suggestions, which have greatly improved the presentation of our manuscript. We have carefully considered all of the reviewers' comments and have revised our manuscript accordingly. We have double-checked the spelling and grammatical errors raised by the reviewers and corrected each one of them. Details can be seen in the tracking changes in the revised version. In the next section, we summarize our response to each of the reviewers' comments. We believe that our response addresses all of the reviewers' issues well. We hope that our revised manuscript will be accepted for publication.

Comment 1: Related comments on asphalt ductility in Table 2 : "This shos relatively lower ductility values. Is is common for this type of PMB in your country? "

Response 1: The ductility of this modified asphalt is in line with our national specifications, and is more commonly used in our country.

Comment 2: On the effect of DMA specimen size on experimental results: **"**I am just thinking if there are not some additional effect related to the size of test specimens. E.g. with a thickness of 3.5 mm we can easily measure properties of an aggregate grain since in AC13 or SMA 13 a lot of aggregate particles is larger than 3.5 mm. How do you avoid that this has not an influence of the test results. and that really the compelx mixture including the interaction of small or large aggregate particles and binder is tested and considered correctly. I like DMA testing, just a bit see this as a drawback."

Response 2: Thank you for your comment, we think the point you made is very relevant and a very worthwhile point to explore. First of all, we acknowledge that the size of the specimens is an important influence on the test results, and our choice of DMA for the evaluation of in-service pavements is also based on the consideration that small size specimens cause less damage to the pavement. On the one hand, we propose a solution to this problem: the core samples drilled from the pavement can get more than 20 pieces of specimens, and we test the density with all the core samples, and the results are normally distributed, we choose 4-5 pieces of specimens close to the median of the normal distribution for the test, and take the average value of the results after eliminating the abnormal values as the final experimental results, which can effectively avoid the influence of the small size of the specimens on the test results. This can effectively avoid the

influence of small specimen size on the test results. On the other hand, the use of DMA to test the mechanical properties of asphalt mixtures has been continuously researched by our group for many years, and previous studies can prove that the regularity obtained from the tests using the sample processing method described above is reliable and can greatly reduce the variability.

Comment 3: Questions related to test conditions: "Would it be not usefull like we are doing for complex modulus testing e.g. by 4PB to have a range of frequencies and even to calculate than a master curve? This could eventually limit the need for specific cooling if testing is done and -20°C or -30°C."

Response 3: Because the main purpose of this study is to obtain the phase transition characteristic temperature of asphalt-like materials through dynamic mechanical analysis, and the phase transition characteristic temperature of asphalt-like materials in general is in the range of -30-70°C, so the test temperature range of -30-70°C is chosen. The load frequency of 1 Hz was chosen to make the material in the linear viscoelastic region during the test. If the main purpose of the study is the master curve, more frequency ranges will be extended.

Comment 4: Regarding the increase in molecular weight of asphalt mixtures due to aging in 3.1: "Can this statement somehow be aupported by data?"

Response 4: Thank you for your comment. We strongly agree with your point of view, which greatly contributes to the integrity and rigor of the study. This view is a possible speculation based on other research literature for the experimental results we obtained, and we do not have relevant experimental data yet, so we add relevant literature to support this view, and we will conduct relevant studies to confirm this speculation when available.

Some of the language issues you mentioned have been changed in the manuscript, and we've included them below for your convenience:

1) In the 2.2.4 on page 8: We have changed the middle point to inflection point as you suggested and corrected the numbering of the formula.
2) We have rewritten the third sentence of the first paragraph on page 11 to enhance readability based on your suggestion.
3) We have rewritten the last sentence of the first paragraph on page 16 to enhance readability based on your suggestion.

Yours sincerely,

Zhimin Ma