New phan complexes as catalysts for Mukaiyama Aldol addition of $Me_2C=C(OMe)OSiMe_3$ with a variety of fused ring aldehydes or arylaldehydes containing electron-withdrawing substituents

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The Mukaiyama aldol addition is one of the most important organic synthesis leading to β-hydroxy carbonyl compounds for a carbon-carbon bond formation reactions between an enoxysilane and an aldehyde (or ketone). In this regard, a variety of Lewis acids and bases have been tested. Despite the numerous excellent catalysts for the Mukaiyama aldol reaction that have been reported, the search for new catalysts remains of current interest. Herein we will demonstrate that Mukaiyama aldol reactions of $Me_2C=C(OMe)OSiMe_3$ with a variety of fused ring aldehydes or arylaldehydes containing electron-withdrawing substituents are efficiently catalyzed at room temperature by new phan complexes. Also, we will show catalytic activity of new phan compounds are compared with that of other phan compounds already reported in the literature.