Effect of alignment mark architecture on alignment signal behavior in advanced lithography

Alignment mark architecture is divided into two types, which depending on where the mark is defined. Alignment mark that is defined through the contact masking steps is known as contact mark and alignment mark that is defined through metal masking steps is known as metal mark. Due to the difference between processing steps for these two layers, alignment mark characteristics exhibits a different nature. Metal mark deformation is not as severe as contact mark since metal mark formation only involved two processing steps, which is etching, and deposition steps. Hence, it is expected that the alignment signal behavior for this two mark type will be different. AH32, AH53, and AH74 metal and contact alignment mark was evaluated. Based from the results, AH32 mark shows a significant trend difference between contact and metal mark. This is due to the fact AH32 contact mark is the easiest to be deformed since its feature size is the biggest compared to AH53 and AH74. AH53 and AH74 alignment signal performance between contact and metal mark are comparable.