

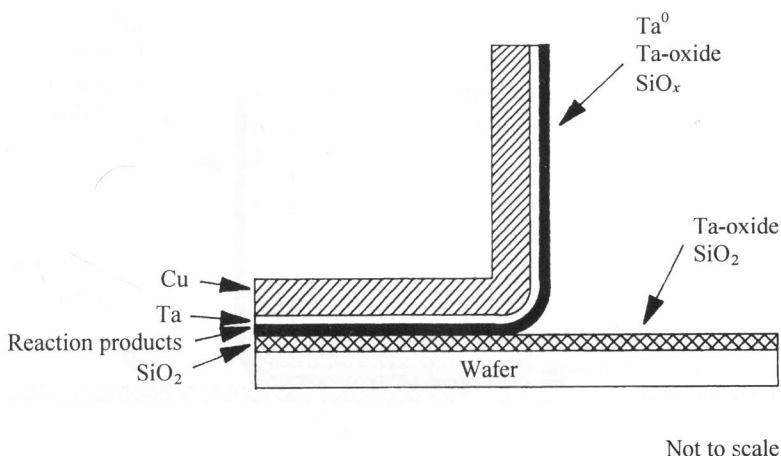


Figure 10. Schematic representation of locus of failure for Ta/SiO₂.

4. SUMMARY

Based on the findings described above the following statements can be made:

- Ta/SiN is the strongest interface tested. It should be noted, however, that this conclusion does not imply that the Ta/SiN interface is stronger than the Cu/Ta peel film, as the phase angle will drive a crack through the Cu/Ta film rather than along the interface [18].
- Cr/SiN interface is weaker than the Ta/SiN but stronger than Ta or Cr interfaces with SiO₂. The Cr/SiN fails between the reaction products layer and the residual modified SiN layer. In this case the interfacial region becomes brittle enough for the crack to deviate from its natural course (cohesive failure or tearing of the metal peel strip) to crack growth parallel to the interface. The data suggest that the reactions at the Cr/SiN interface embrittles the otherwise strong SiN.
- Ta/SiO₂ and Cr/SiO₂ interfaces are very weak.
- Silicide formation is suggested with Cr on both SiN and SiO₂, while Ta appears to not form a silicide with SiO₂.

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