

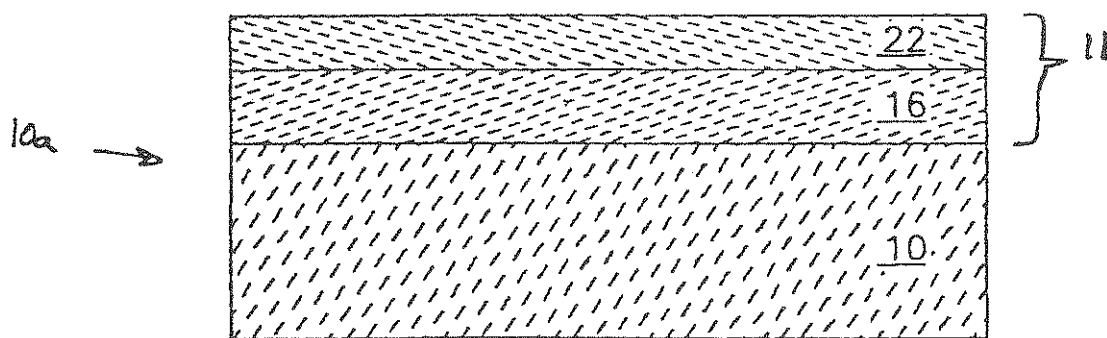


Fig. 1

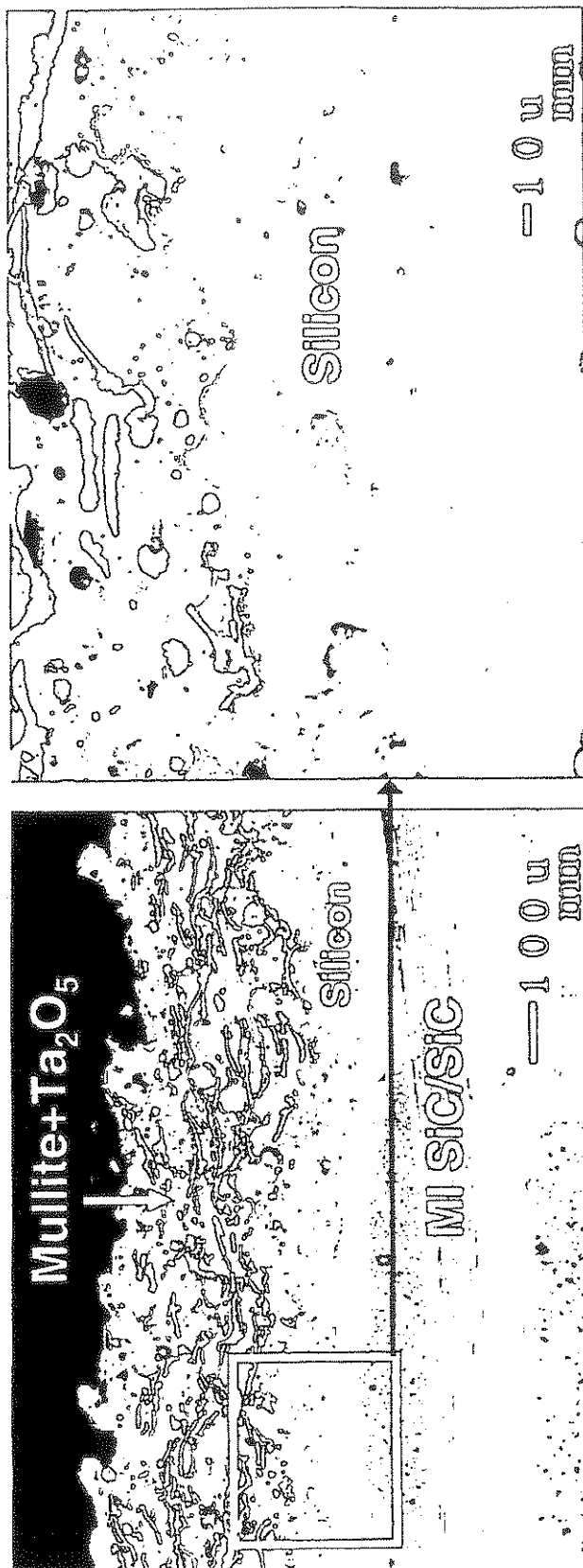


Figure 2

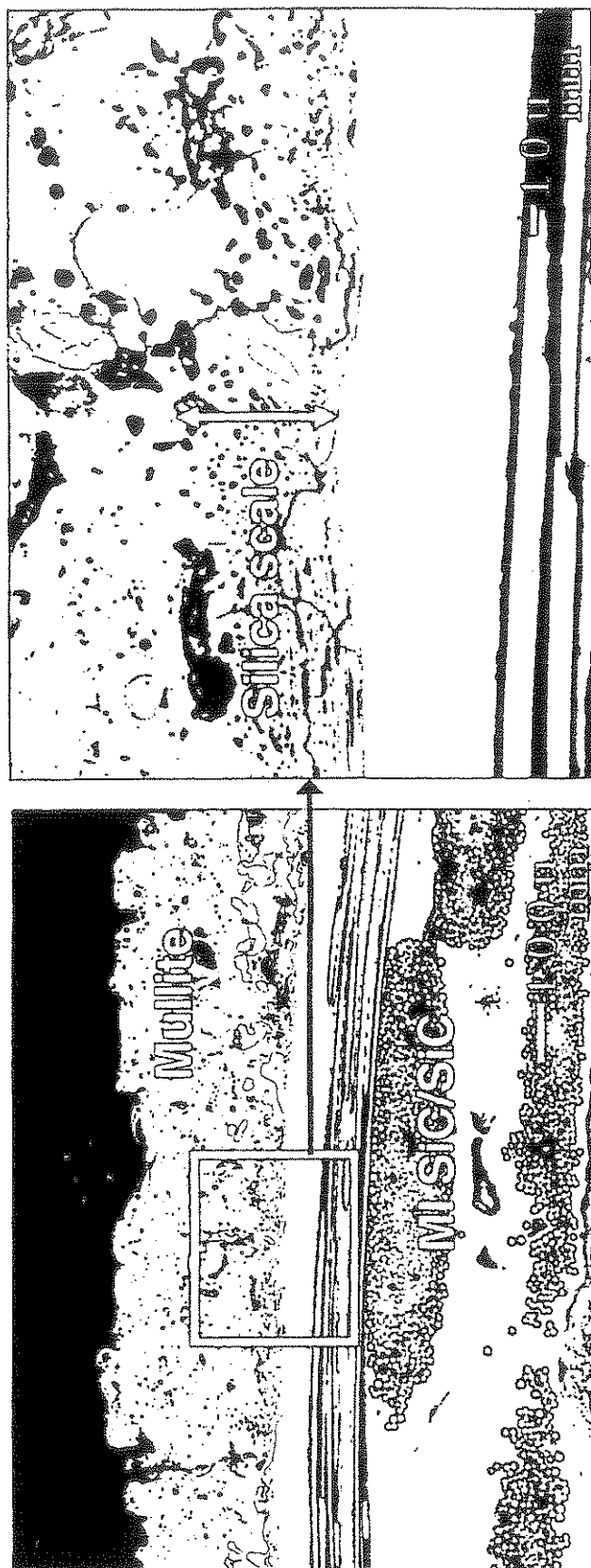


Figure 3

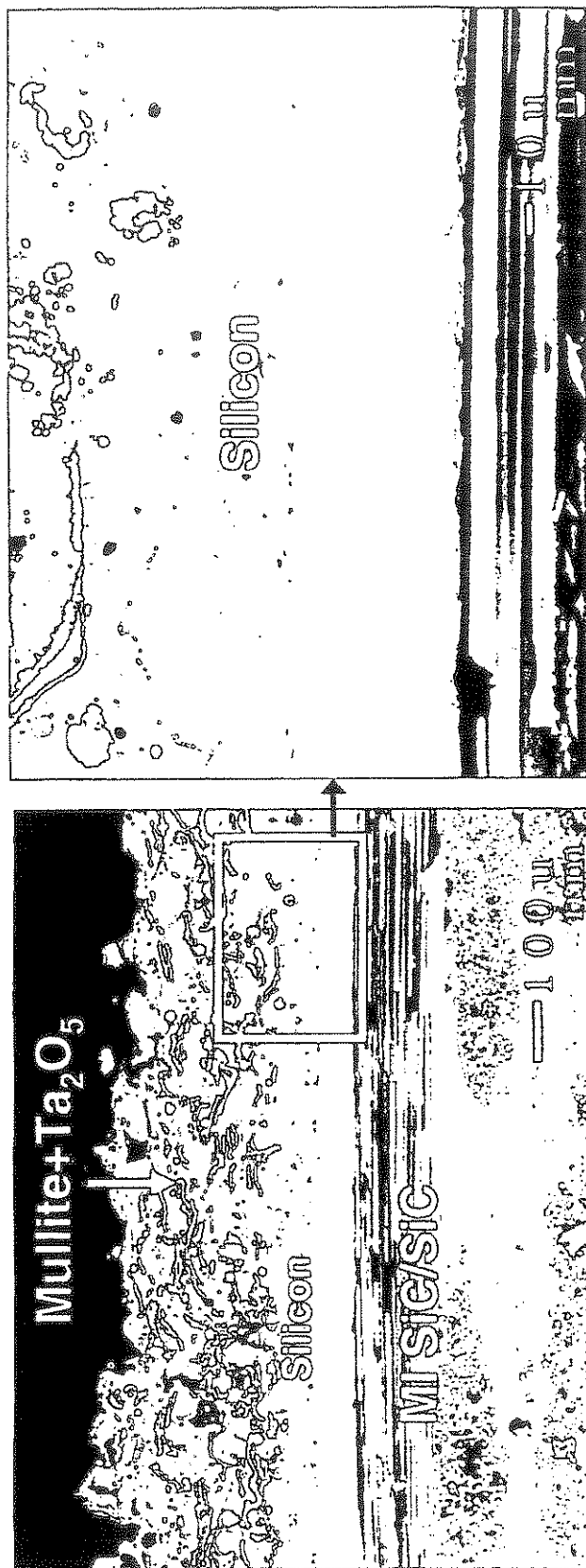


Figure 4

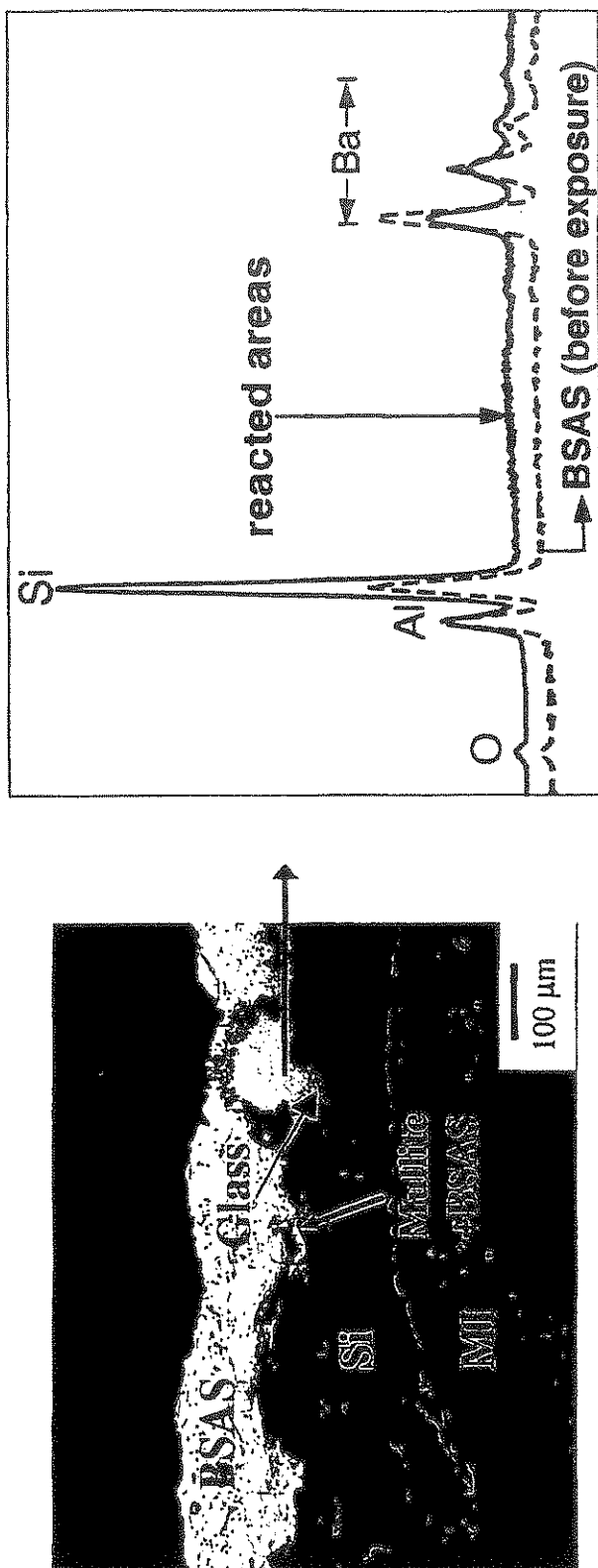


Figure 5

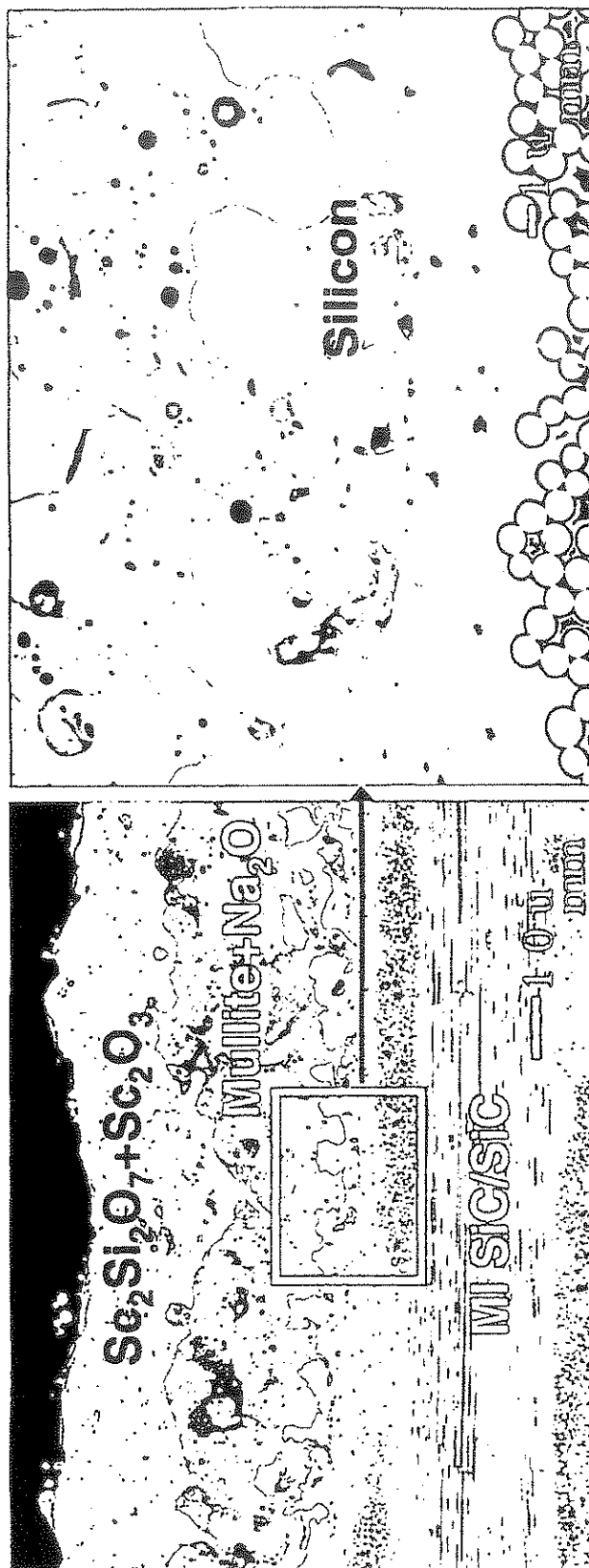


Figure 6

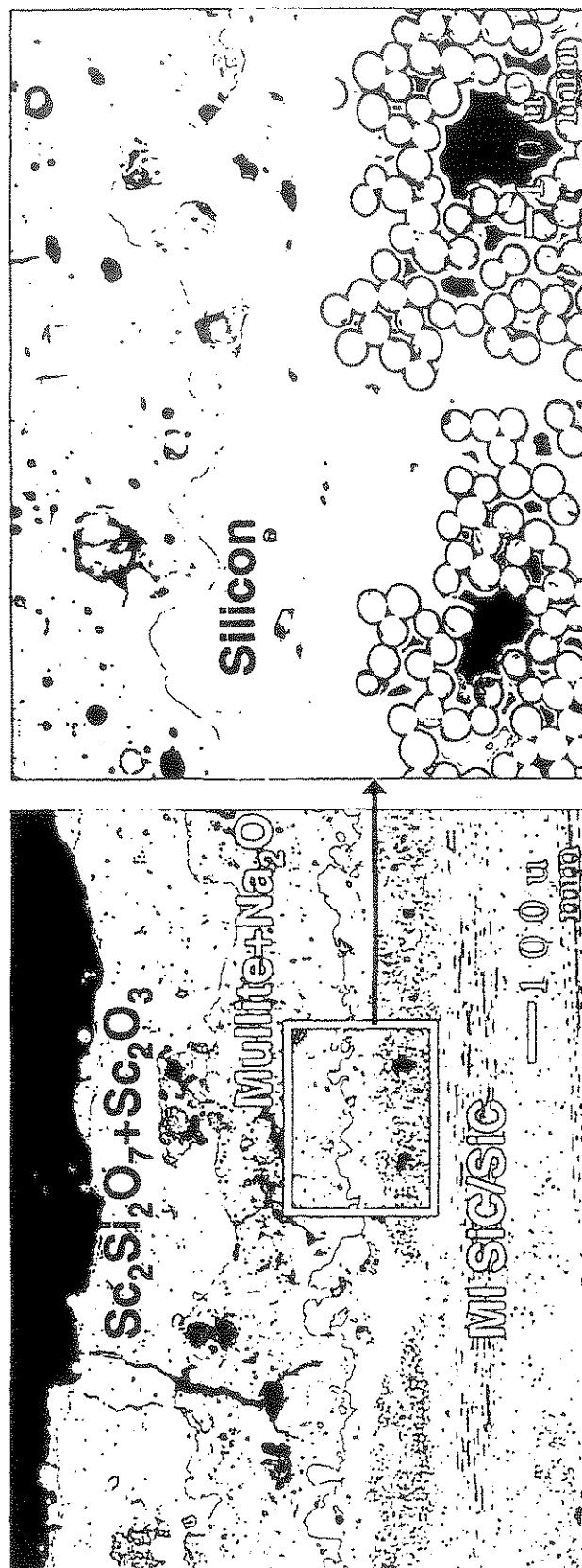


Figure 7

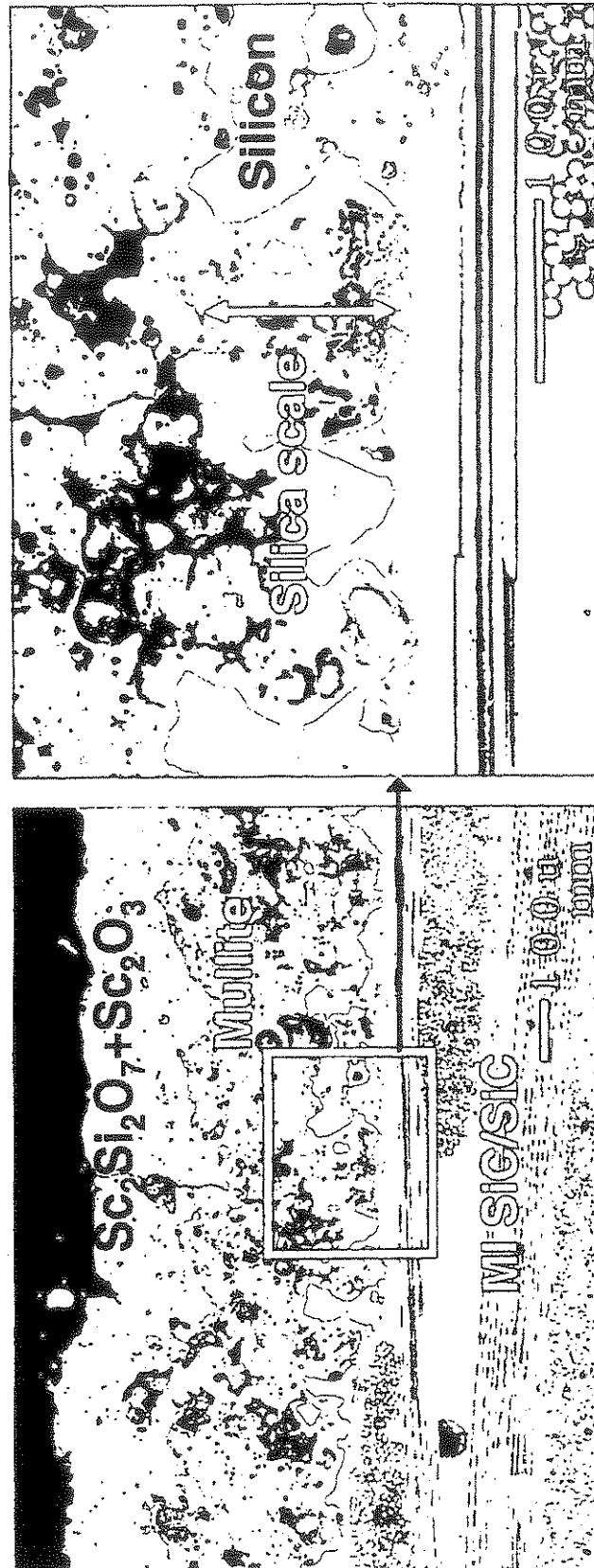


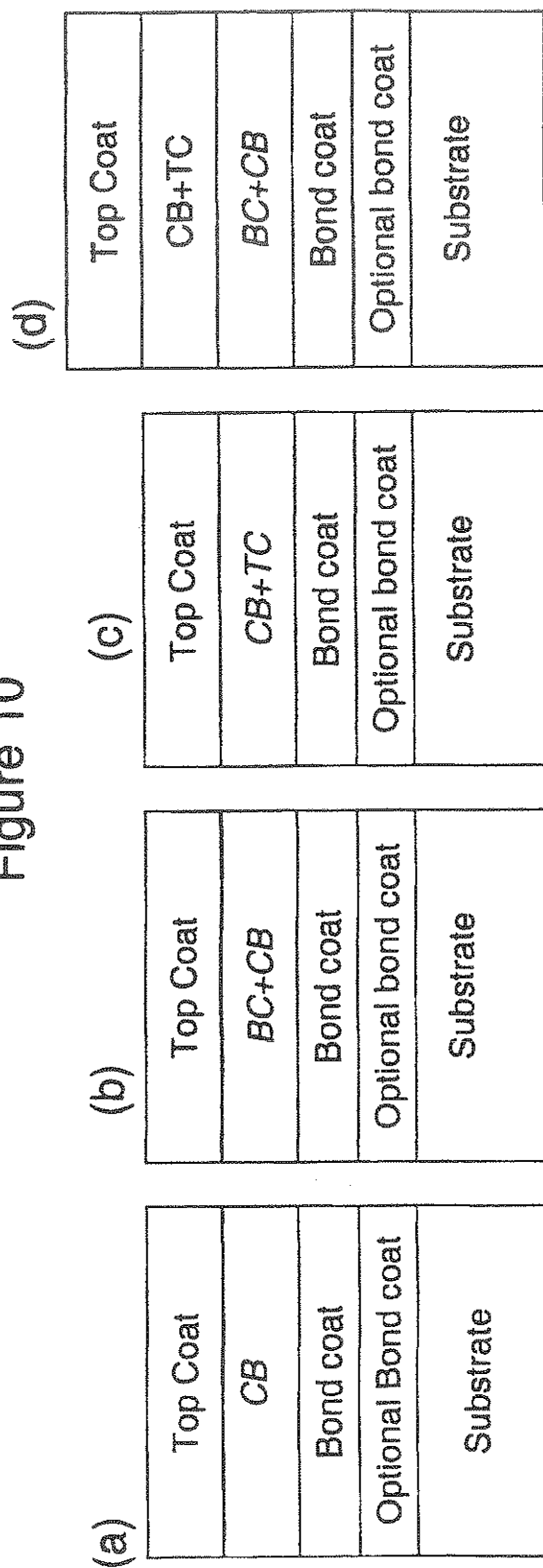
Figure 8

Figure 9

Top coat	BSAS, HfTiO ₄ , HfO ₂ , RE ₂ SiO ₅ , RE ₂ SiO ₇ , RE ₂ O ₃ , RE ₂ O ₃ -ZrO ₂ , RE ₂ O ₃ -HfO ₂ , combinations thereof
Chemical Barrier	HfSiO ₄ , RE ₂ SiO ₅ , RE ₂ SiO ₇ , combinations thereof
Bond Coat	Si, Mullite, BSAS, RE ₂ SiO ₅ , RE ₂ SiO ₇ , RE ₂ O ₃ , Ta ₂ O ₅ , combinations thereof; Optionally dope with alkali and alkali earth metal oxides
Optional bond coat	Silicon, metal silicides, combinations thereof

RE: Sc, Y, Lu, Yb, Tm, Er, Ho, Dy, Tb, Gd, Eu, Sm, Nd, La, combinations thereof;

Figure 10



* CB: Chemical barrier; BC: Bond coat; TC: Top coat

** CB, BC+CB, and CB+TC can be a single discreet layer or can form alternating

layers with BC and/or TC (BC/CB/BC/CB..., CB/TC/CB/TC...,

BC/BC+CB/BC/CB..., CB+TC/TC/CB+TC/TC..., etc),

*** Compositional grading can be created in BC+CB and/or CB+TC

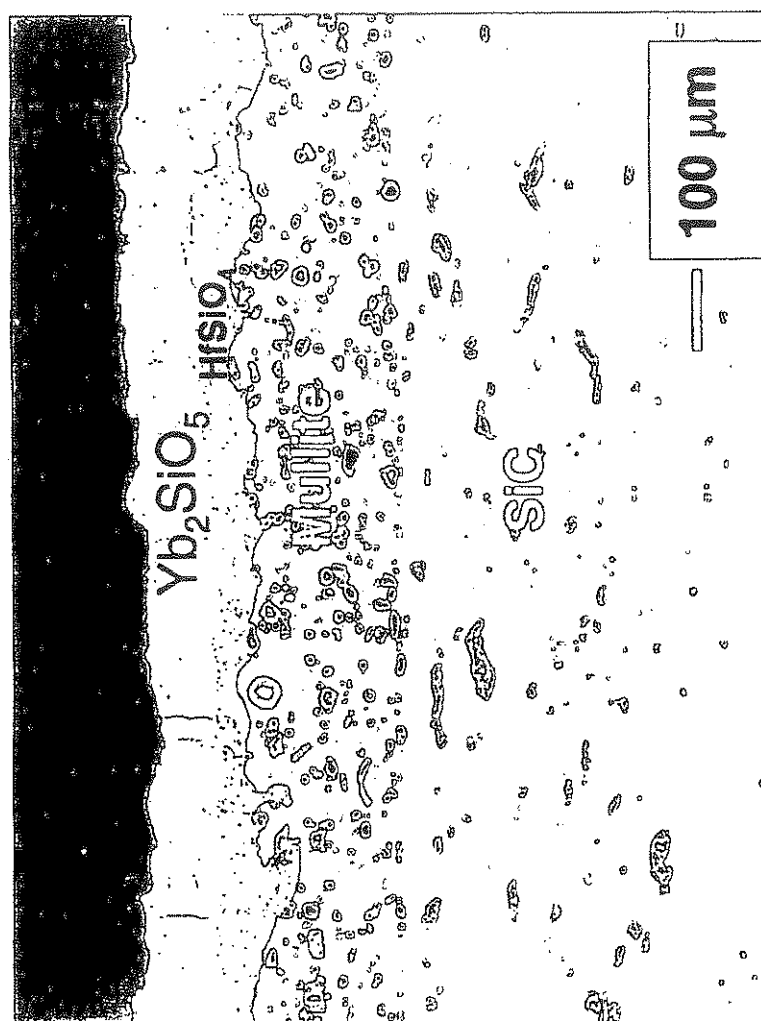


Figure 11

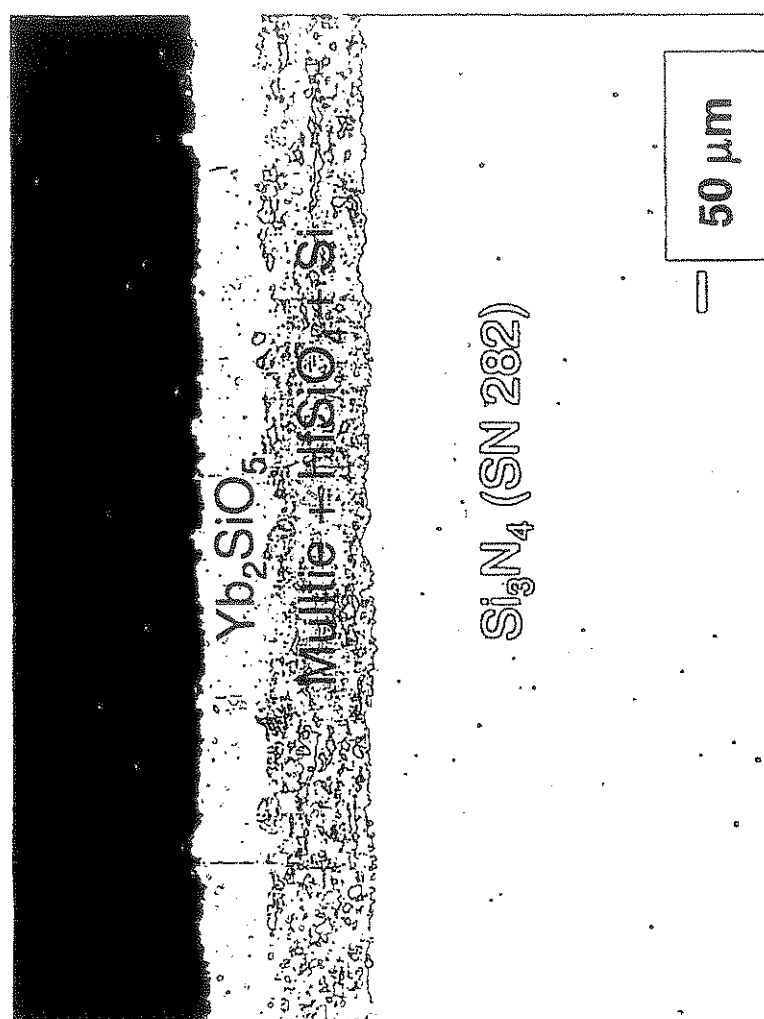


Figure 12