A WINDOWLESS SI ANODE X-RAY TUBE FOR THE EFFICIENT EXCITATION OF LOW Z ELEMENTS ON SI WAFER SURFACES WITH TXRF

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To excite low Z elements efficiently low energy photons are required, specially to detect Al and Na on Si wafer surfaces photon with an energy below the Si –K edge but above the Al-K edge. Using synchrotron radiation is the most effective way but also for lab scale instrumentation there are some approaches. Besides W-M lines also the use of Si K line is possible. An additional problem is the fact that total reflection geometry requires a collimated beam, so a fine focus X-ray tube configuration should be used. But this requires a low take off angle (generally 6°) which leads to strong self absorption of the low energy X-ray photons.
Experiments with a windowless Si anode tube - a modified old Siemens diffraction tube Ag3Ö - are presented. White beam excitation and excitation with monochromatized beam produced with a Ni/C multilayer are compared.