Talking about TXRF

Alex von Bohlen

Dear TXRF user,

Hello, I am Alex von Bohlen. I started working with TXRF in 1984. At that time, nearly no application was known. Knut Freitag form Seifert Co. and I started making connections for bring together the existing little community of TXRF users. The first workshop, including colleagues from Austria (Aiginger, Wobrauschek, Streli) and Germany, was held in Geesthacht near Hamburg in 1986. It was organized by Michaelis and Prange. The meeting was dominated by two groups: The first was that of analytical chemist looking for applications, the second group was the developers of instruments. After a successful and fruitful two-days meeting, I propose to use the acronym TXRF according to IUPACS suggestions of four capital letters. This suggestion was accepted by all attendees.

Today, TXRF and GI-XRF are established micro method of instrumental analytical chemistry and of surface analysis. In our historical reviews the crucial publication is:

Yoneda and Horiuchi,, Optical Flats for Use in X-Ray Spectrochemical Microanalysis, Rev Sci Instruments 42, 1069 (1971)

May be that it is the starting point for the modern development of the method, the very first publication dealing with total reflection of X-rays is:

HA Compton, Phil Mag 1923 The total reflexion of X-rays.

Timetable

100 years ago – Compton's publication

50 years ago – Yoneda & Horiuchi

35 years ago – 1st user meeting

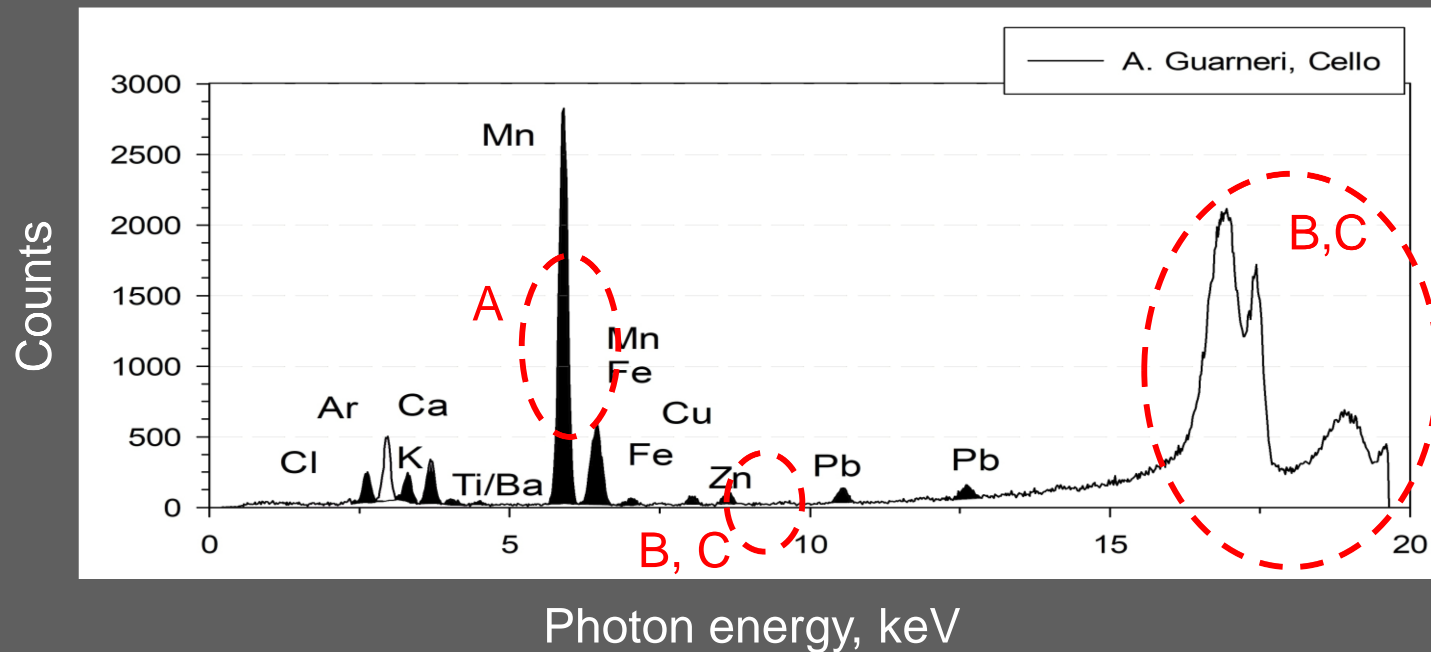
25 years ago – 1st TXRF book by Klockenkämper

6 years ago – 2nd Edition of TXRF book by Klockenkämper & von Bohlen

Today, DIN and ISO norms based on Round-Robin tests are in preparation and the careful use of the method according to the suggestions of specialists is emphasized.

I whish you a successful and interesting Summer School, and for your future work with TXRF a lot of creativity without restrictions and freedom for research.

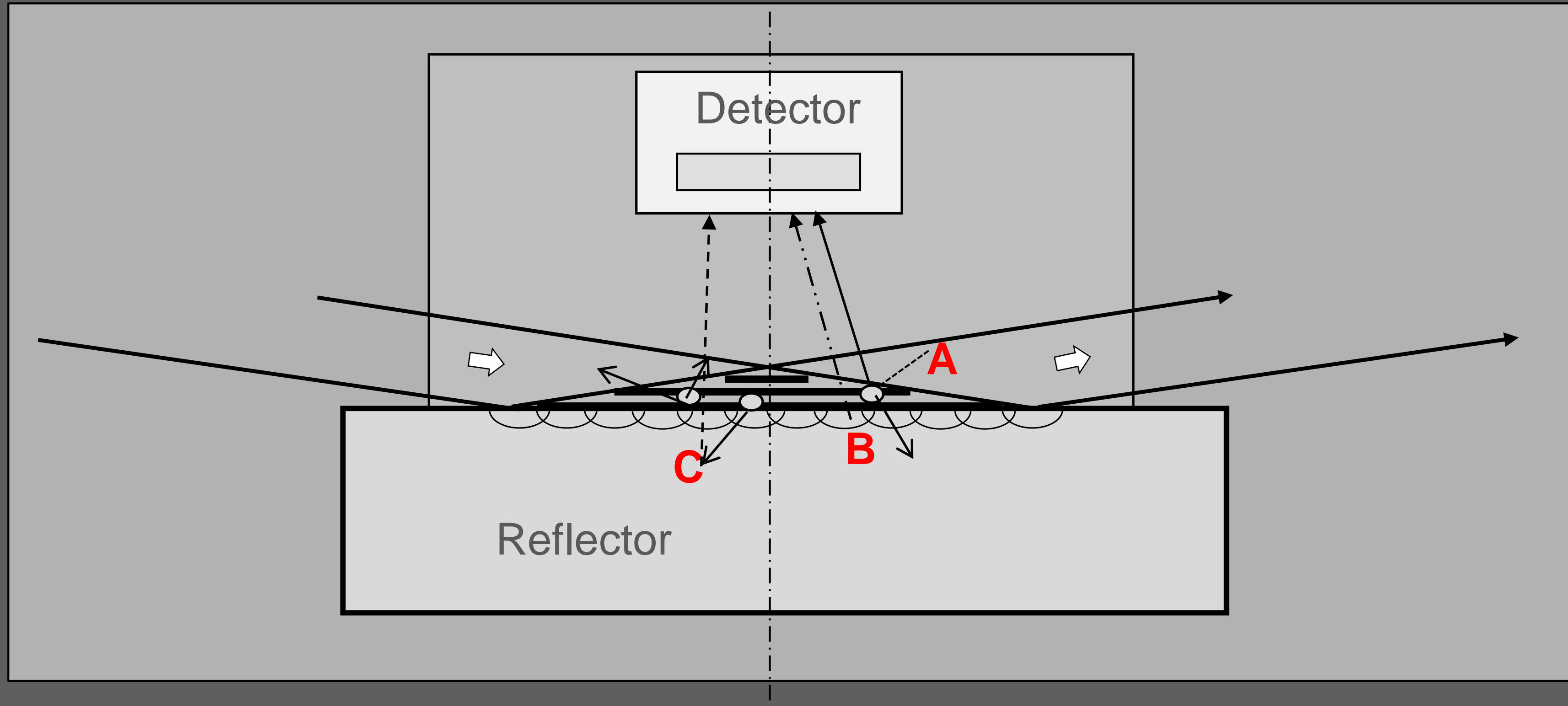
Alex von Bohlen



Contribution to the composition of TXRF spectrum

Double intensity
Very low background
Very low scatter

Where are the signals of **TXRF** coming from ?



A – fluorescence of sample material

B – Contribution of the evanescent wave

C – secondary fluorescence

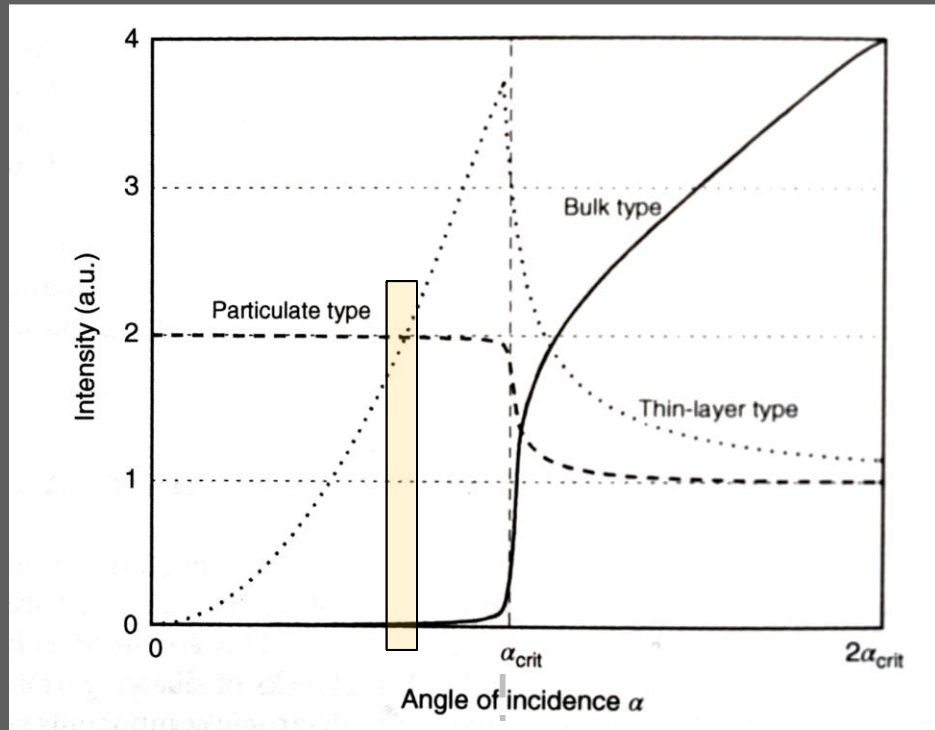
A – influencing the signals of detected elements

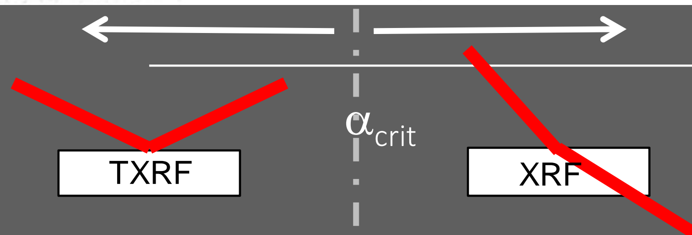
B – signals of spectral background and scattered excitation

C – different contributions

Schematic representation of **TXRF** with XSW field

Influence of the signals of the analyte are directly correlated to the concentration / content of elements in the sample. Do not overload. The linearity should not be stressed.





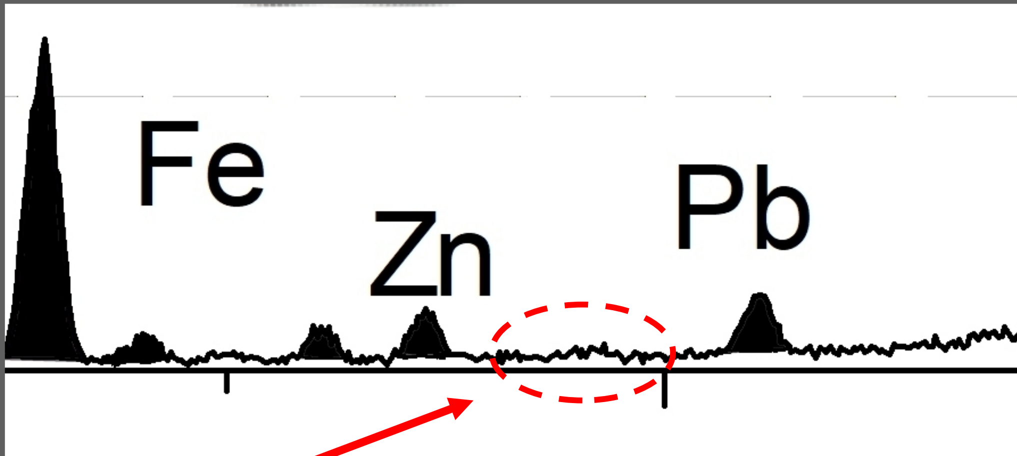
Optimal angle of excitation

α_{crit} = critical angle of total reflection

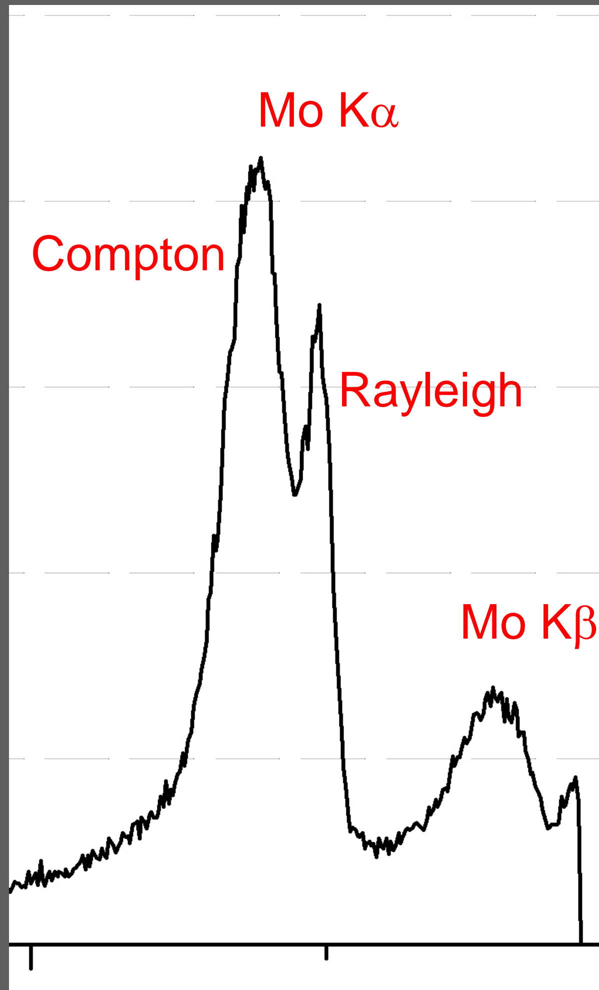
Signal intensity ‘particulate type’ is also valid for residues (two times excited below α_{crit}.

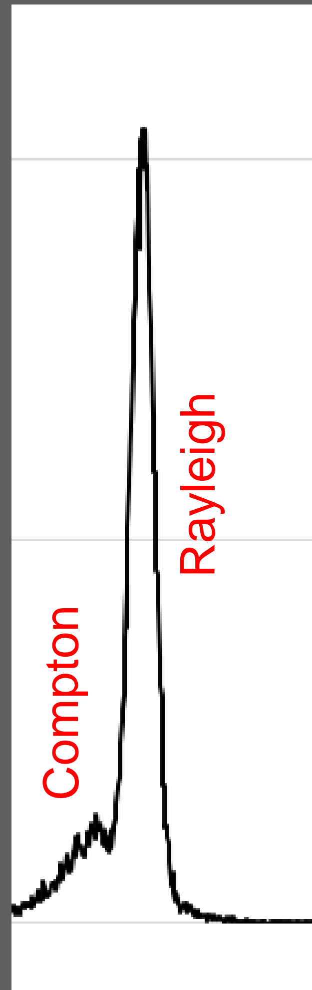
Where are the signals of TXRF coming from ?

The penetration of the primary radiation into the reflector material influences the spectral background. It is also reflecting the quality of the surface of the reflector. Tolerable is a value of about ten to twenty counts per channel and per 100 seconds.



Where are the signals of **TXRF** coming from ?





Rayleigh and Compton scattering is influenced by the 'matrix-composition'

Left: light elements
Right: heavy elements

Where are the signals of TXRF coming from ?

Scattered primary radiation

The origin of the different signals and the influence factors cannot be observed by TXRF

They are only accessible by GI-XRF

There is no optimal excitation condition for all combinations of primary excitation and reflector materials. A good compromise is 70 % of the critical angle of total reflection.

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With compliments

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