

Experimental Determination of Lowering of the Ionisation Energy in High Density Plasmas of some Metals (Al, Si)

K. Hönle, W. Osterrieder und H. Krempel

Hot dense plasmas were produced by focussing giant laser pulses (1 J, 35 ns) into the surface of some metallic targets. Temperature and electron density were determined by a time resolved study of the spectral line emission in the region from 250nm to 700nm. The spectra showed lines of Al III and Si IV respectively. For temperature measurement the "Normtemperatur-Methode" according to LARENZ-KREMPL was chosen. The maximum intensity of the Si-IV-lines, which appeared 30ns after the maximum of the laser pulse, indicated  $T = 7 \times 10^4$  degrees. The maximum electron density resulting from STARK broadening measurements was  $2 \times 10^{19} \text{ cm}^{-3}$ . The lowering of the ionisation energy was estimated from the disappearance of spectral lines with high excitation energy when the laser power was increased. The results were compared with calculations of the composition of plasmas according to various theories of the lowering of the ionisation energy (DEBYE-HÜCKEL, GÜNDEL, ECKER-KRÖLL).

K.Hönle

Institut für Physikalische Chemie  
und Theoretische Chemie  
der Technischen Universität München  
8046 Garching  
Reaktorgelände  
Germany