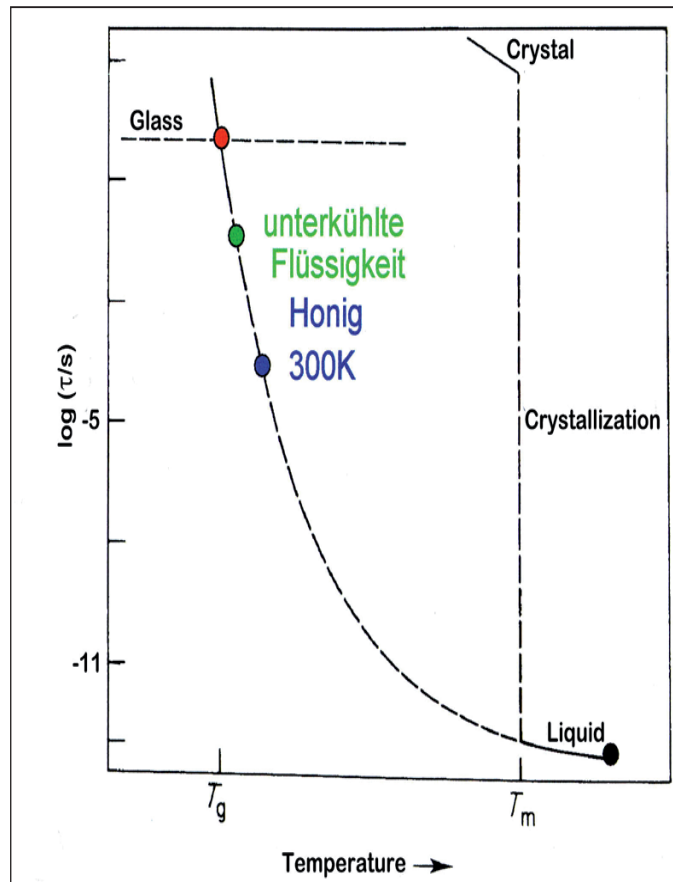


Eigenschaften metallischer Gläser

Prof. Dr. Konrad Samwer
Universität Göttingen



Glass is a very old material that has been used for centuries, but is still the subject of current research. In this lecture, I will begin by introducing the material »glass« for a general audience by showing some typical examples and properties. Then I will focus on the comparatively new subclass of metallic glasses and show some recent results on the dynamic mechanical properties of so called »fragile« and »strong« glass-forming liquids. These are the typical representatives of more than 30 metallic glass systems which are currently known and used in a variety of applications. A microscopic model for the macroscopic properties of these materials was recently developed in collaboration with W.L. Johnson's group at Caltech. The alpha- and beta-relaxation of the systems can be explained within the potential energy landscape picture. Here we combine these ideas with computer simulations developed by S.G. Mayr et al., which give an insight into the origin of the typical glassy behaviour, which is quite different compared to crystalline materials. Using these results, we can predict the rheology of metallic liquids including the strain-rate dependence and compare the model with the latest ultrasound measurements of the shear modulus which is the most important material parameter.