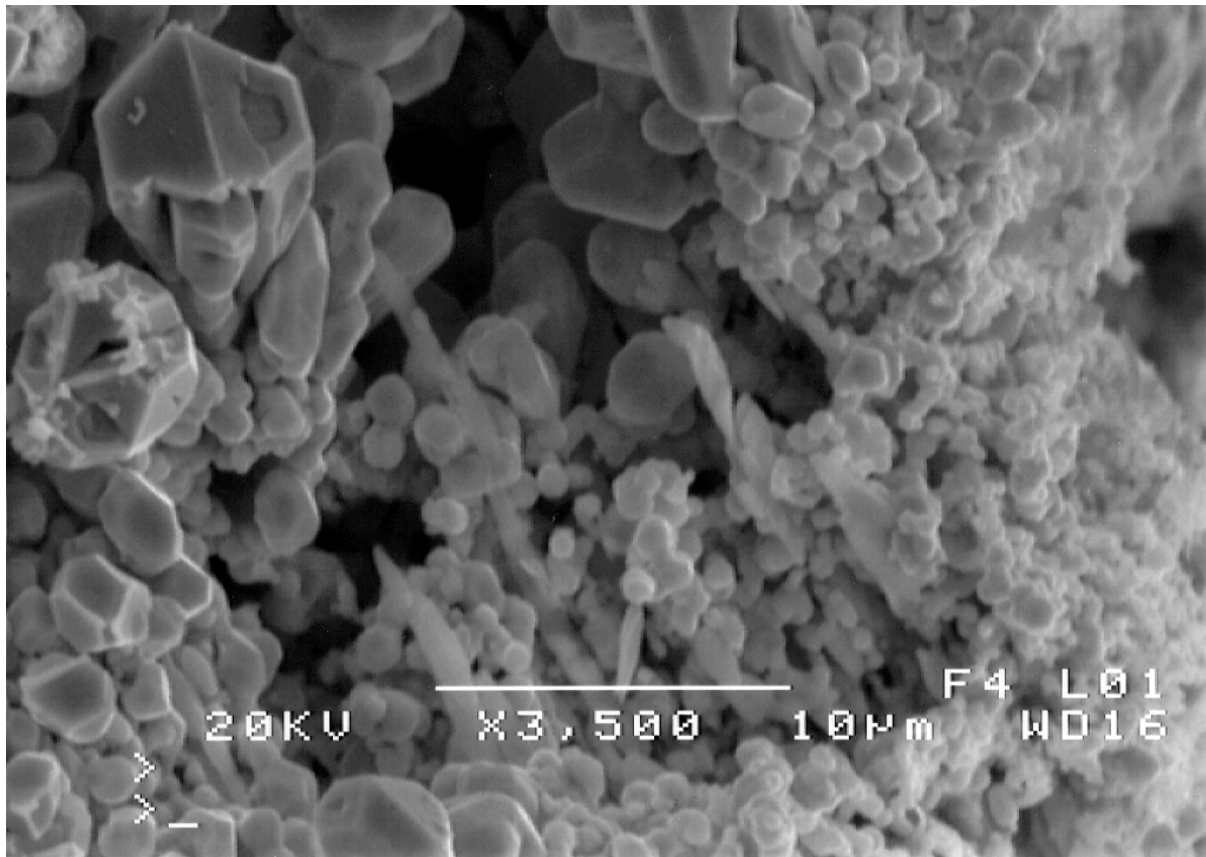


# Ternary high-strength Cu-based in-situ metal matrix composites

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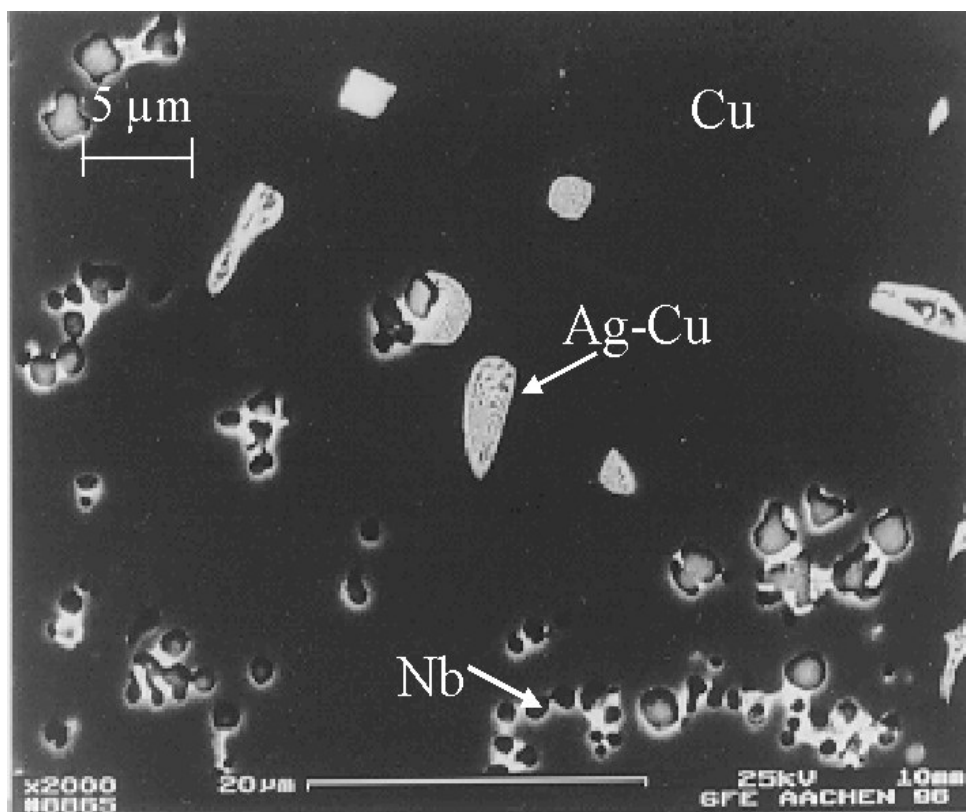
Cu and most high melting body centered cubic (bcc) transition metals have negligible mutual solubility by practical means. Fibre or ribbon reinforced in-situ metal matrix composites (MMCs) can thus be processed by large degrees of deformation, e.g. by cold rolling or wire drawing of cast ingots. These Cu-bcc alloys are of considerable interest since after heavy deformation very high tensile strength combined with good electrical conductivity can be achieved. Furthermore, fundamental aspects such as the origin of the extreme strength attract much attention.



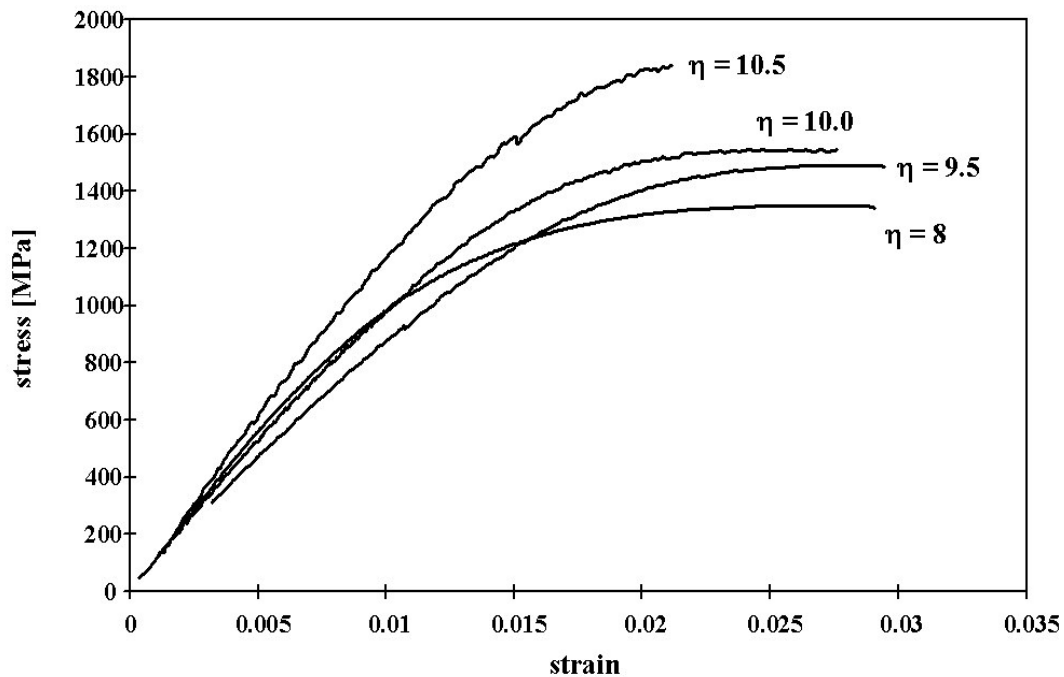
**Nb extracted from an as-cast Cu-Nb-Ag composite.**

In the last years substantial efforts were made to investigate and optimize alloys based on the binary systems of Cu with Nb (bcc) or Cr (bcc). Additional investigations addressed in-situ MMCs that are based on the eutectic system of Cu and Ag (fcc). While in the first case the fibers are formed by the elongated body centered cubic phase (Nb, Cr), in the second case Ag precipitations were used to increase the matrix strain and / or to form additional fibers after wire drawing or rolling.

Our present projects deal with the experimental investigation and theoretical prediction of a new generation of composites that combine both mechanisms. These alloys which have a high electrical conductivity and a high strength are based on the ternary systems Cu - Nb - Ag and Cu - Cr - Ag.



**Microstructure of an as-cast Cu-Nb-Ag composite.**



**Strength of a wire-drawn Cu-Nb-Ag composite.**

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Part II: Electromagnetic Properties and Application“

