Zinc salts action to reduce the kinetics of glass atmospheric alteration.

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Active degradation is observed on the surface of numerous glass objects stored in the museums, through macroscopic manifestations, mainly white salt deposits and crizzling, resulting in loss of transparency and material disintegration. The related mechanisms strongly depend on the glass composition and conservation conditions and are not well understood. Until now the best protective measure applied by conservators and curators is the control of the environment (temperature (T), relative humidity (RH), pollutants) within suitable museum display cases. Nevertheless, by acting directly on the glass surface, more efficient and less costly protective methods could be proposed. We are focusing in this study on the possibility that a small deposit of zinc salts may efficiently reduce the alteration kinetics of chemically unstable ancient glass (alkali (Na,K)–rich silicate).

To this purpose, the mechanisms underlying the atmospheric alteration as well as the protective action of zinc salts are investigated by the mean of ageing experiments (T and % RH control) on relevant ancient glass composition replicas. Treated glasses develop a significantly thinner hydrated layer thickness than the untreated one. Furthermore, zinc salts treatment modifies the nature of salts on glass surface. Zn(II) neutralizes the hydrated silicate layer by precipitating with OH^- ions. Moreover, GI-XAS experiments and Tof-SIMS profiles indicate that Zn(II) ions also bond to the silicate network in a thin surface layer, that contributes to passivate the glass. In view of the application, results of the treatment on pre-altered glass surfaces will be presented too.