Role of cellulose oxidation in the yellowing of ancient paper.

The yellowing of paper on aging causes major aesthetic damages of cultural heritage. It is due to cellulose oxidation, a complex process with many possible products still to be clarified. By comparing ultraviolet-visible reflectance spectra of ancient and artificially aged modern papers with ab initio time-dependent density functional theory calculations, we identify and estimate the abundance of oxidized functional groups acting as chromophores and responsible of paper yellowing. This knowledge can be used to set up strategies and selective chemical treatments preventing paper yellowing.