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Photochemistry of aqueous glycine aerosol droplets in the visible spectral range

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Chemical reactions of aerosol particles are known to follow reaction pathways and kinetics that can be very different from bulk solution [1-3]. For example, many reactions are accelerated in aerosol particles compared to bulk solutions [3]. The unique properties of the aerosol surface are often hypothesized to be responsible for these differences [1], but in most cases the physical origin of these differences remains poorly understood. In this work, we study an unexpected photochemical reaction of aqueous glycine particles induced by green visible light [4]. As the simplest representative of its class, glycine is often used as a proxi for other amino acids. Upon irradiation with visible light (532 nm), the volume of the aqueous glycine droplets shrinks with a constant rate over the major part of the photochemical process. This indicates the presence of a photosensitizer, which we attribute to mesoscopic glycine clusters [4]. Molecular glycine is virtually non-absorbing in the near-UV and visible spectral range, similar to other amino acids [5]. However the absorption of glycine changes and increases when it aggregates to mesoscopic clusters [6]. To the best of our knowledge, this is the first experimental evidence of a photochemical pathway facilitated by mesoscopic clusters. Light interaction with such mesoscopic photoactive molecular aggregates might be important for aerosol photochemistry.

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