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Growth and dissolution of the hydrogel-grown lysozyme crystals

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We recently developed a new method for growing protein crystals in a high-concentration hydrogel. Using the method we can crystallize protein crystals with increased mechanical stability, as a result the crystals give us high resolution of X-ray diffraction pattern. On the other hand the crystals contain the hydrgel fragments and the effects on crystal defects such as dislocations were unknown. In this study, we slightly etched the crystal surface and estimated the dislocation density.

Hydrogel-grown and solution-grown LZM crystals were slightly dissolved by increasing the temperature, and their surface morphologies were observed by laser confocal microscopy. The solution-grown crystals exhibited deep etch pits at 303 K, while the hydrogel-grown crystals exhibited etch pits at a higher temperature (305 K). In addition, the density of the etch pits on the solutiongrown crystals at 305 K was significantly higher than that on the hydrogel-grown crystals at the same temperature. These results demonstrate that the hydrogel-grown crystals are more tolerant of temperature changes than those grown in solution.