

Abstract Submitted  
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**Femtosecond snapshots of nano crystalline response to XFEL pulse trains**<sup>1</sup> YOSHIAKI KUMAGAI, GILLES DOUMY, ANTHONY DICHIARA, TIJANA RAJH, ELENA SHEVCHENKO, HAIDAN WEN, LINDA YOUNG, Argonne National Laboratory, ANDRE AL HADDAD, CHRISTOPH BOSTEDT, Paul Scherrer Institut, ANDREAS GALLER, European XFEL, JAN OFFERMANN, The University of Chicago — The European XFEL enables sequential single-shot diffraction snapshots at megahertz repetition rates. These rapid-fire pulses have been successfully applied for serial femtosecond crystallography [1,2] where a fast flowing target delivers a new sample between shots. However, the use of high-repetition-rate pulses for an individual fixed-in-place target depends critically on understanding the response of the target— damage to which limits the usable fluence per image. We have investigated the response of a CdSe nanocrystalline target using a novel pulse-on-demand method where sequential single-shot diffraction images were acquired for a variable number of x-ray pulses over a wide range of fluence. Unusual features appear in the diffraction pattern and morphology that can be used to model the target response. [1] M. L. Grnbein *et al.*, Nat. Commun. **9**, 3487 (2018) [2] M. O. Wiedhorn *et al.*, Nat. Commun. **9**, 4025 (2018)

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