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**Field emission mitigation studies in 1.3GHz LCLS-II cavities via *in situ* plasma processing** BIANCA GIACCONE, Illinois Institute of Technology, Fermi National Accelerator Laboratory, MARTINA MARTINELLO, PAOLO BERRUTTI, OLEKSANDR MELNYCHUK, ANNA GRASSELLINO, Fermi National Accelerator Laboratory, DMITRI SERGATSKOV, Retired, DAN GONNELLA, MARC ROSS, SLAC National Accelerator Laboratory, MARC DOLEANS, Oak Ridge National Laboratory, JOHN ZASADZINSKI, Illinois Institute of Technology — Field emission (FE) is one the main factors that can limit the accelerating gradient and quality factor at which a superconducting radio frequency cavity can operate. SRF cavities processing and preparation has been optimized to minimize the chances of introducing field emitters, however the cavity's performance can deteriorate over years of operation of the accelerator. We are studying plasma processing as a possible method to reduce FE caused by hydrocarbon contamination, specifically for the Linac Coherent Light Source II (LCLS-II) SRF cavities. The procedure will be applied *in situ* in the cryomodules, allowing to address FE mitigation without disassembling the accelerator. Having developed a novel method of plasma ignition for LCLS-II 1.3GHz cavities, we applied plasma processing to clean cavities, and cavities with natural field emission or artificially contaminated. All the cavities were cold tested before and after plasma processing to compare their performance. It was proved that the technique is successful in mitigating hydrocarbon related field emission, without affecting the high Q-factors and quench fields that are typical of LCLS-II N-doped cavities.

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