Aging Effects on Cold Sprayed Al 6061 Alloy Stress Corrosion Cracking Response

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Cold Spray additive manufacturing (CSAM) utilizes high-pressure gas to deposit powder feedstock to generate low-porosity components; however, the stress-corrosion-crack (SCC) resistance of deposit components rely heavily on careful selection of process parameters and effective post-deposition heat treatments. While the nature of 6061 Al grants SCC resistance, catastrophic failure can occur in the presence of stress where inter-splat bonding is limited as reagents dissolve inter-splat boundaries when components are CSAM-built. SCC response in CSAM Al 6061 deposits was evaluated and compared to wrought specimens of the same alloy. Crack-growth evaluations performed using fractography was used to evaluate the influence of precipitate formation on specimen response during SCC testing and determine how aging implemented post-deposition improves bonding and reduces failure at boundary regions. The authors gratefully acknowledge support from The Office of the Secretary of Defense (OSD), DEVCOM - Army Research Laboratory and LIFT through the “K005-01 PROJECT# 21025” grant, entitled, “Research Utilizing the Chemistry–Process–Structure–Property–Performance (CPSPP) Paradigm”.