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DEVELOPMENT OF HOLLOW CATHODES AT SITAEL

Abstract

SITAEL is developing high and low current cathodes for electric propulsion to be coupled with 100-500 W and 3-25 kW Hall thrusters. High-current cathodes include two families of hollow cathodes, named HC20 and HC60, designed to be coupled with high-power Hall thrusters. HC20, with a nominal current of 20 A, was first designed in 2013 and was further developed together with SITAEL's 5 kW Hall thruster, HT5k [1]. Currently, the HC20 is developed in the framework of the Ital-GovSatCom program. The aim of the program is to qualify a 5 kW Thruster Unit (TU) to be used on an Italian Governmental GEO platform as a main propulsion system for orbit rising and station keeping. HC60 is designed to operate at 60 A nominal current and has been developed in the framework of programmes related to a 20 kW Hall thruster, HT20k, since 2015 [2]. HC60 is currently developed in the framework of three research and development programs dedicated to exploration and transportation missions: the EU CHEOPS program, an ESA Pre-Development Program and an ESA GSTP. Regarding the low-current class, two hollow cathodes, named HC1 and HC3, have been designed to be coupled with low-power Hall effect thrusters. Starting from a simple development model dated 2016, HC1 completed its ground qualification with HT100 (SITAEL 100 W-class Hall thruster) and is going to be in-orbit validated under HETSat project, funded by ESA and the Italian Space Agency. HC3 was conceived for the 400 W-class Hall thruster HT400. Recent activities were carried out in the framework of EU CHEOPS program for low-power electric propulsion subsystem, improving the thermal and mechanical cathode design. In this paper we present the development status and test activities recently performed on the new configurations of HC20, HC60, HC3 and HC1 cathodes. BIBLIOGRAPHY [1] V. Giannetti, E. Ferrato, A. Piragino, et al., "HT5k Thruster Unit Development History, Status and Way Forward", IEPC-2019-878. [2] A. Piragino, E. Ferrato, F. Faraji, et al., "SITAEL's Magnetically Shielded 20 kW Hall Thruster Tests", IEPC-2019-879. [3] D. Pedrini, F. Cannelli, R. Hadavandi, et al., "Recent Advances in Low-Current Hollow Cathodes at SITAEL", IEPC-2019-782.