Surface-type defects are known to influence the achievement of desired material performance. Therefore, a strategy to design and manipulate defect nucleation and formation can improve our understanding and in principle lead to the ability to control performance. The focus of this paper is the design of 2D surface-type defects, such as antiphase boundaries (APB). The origin of antiphase domains (APDs) in $La_{2/3}Sr_{1/3}MnO_3$ (LSMO113) thin film grown on $Sr_2RuO_4$ (SRO214) substrate is explored via the combination of advanced growth, atomic-resolved electron microscopy, first-principles calculations and defect theory. We observed that APBs in the $La_{2/3}Sr_{1/3}MnO_3$ film naturally nucleate at the step on the substrate/film (SRO214/LSMO113) interface (Fig. 1 and 2). Furthermore, atomic-resolved electron microscopy investigation showed that these APBs tend to merge when two steps exist at short distance to minimize the APB surface energy (Fig. 2). Such a design philosophy can be easily transferrable to many oxide-based heterostructure system as well as providing new aspects in non oxide wafers.