Derivation of effective models from heterogeneous second-gradient elasticity with chirality

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We derive effective models from a heterogeneous second-gradient elastic material taking into account chiral scale-size effects. Our classification of the effective equations depends on the hierarchy of four characteristic lengths: The size of the heterogeneities, the intrinsic lengths of the constituents, and the overall characteristic length of the domain. Depending on the different scale interactions we obtain either an effective Cauchy continuum or an effective second-gradient continuum. The working technique combines scaling arguments with the periodic homogenization asymptotic procedure. Both the passage to the limit and the unveiling of the correctors' structure rely on a suitable use of the periodic unfolding operator.