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A New Computational Window into Fractal Morphology ARITRA GHOSH, University of Groningen, The Netherlands, R. BATABYAL, G. P. DAS, B.N. DEV, Department of Materials Science, Indian Association for the Cultivation of Science, Kolkata — We have computationally investigated on-lattice diffusion limited aggregation (DLA) involving edge diffusion and compared the results with the standard DLA model. For both cases, we observe the existence of a crossover from the fractal to the compact regime as a function of sticking coefficient. However, our modified DLA model including edge diffusion shows an extended fractal growth regime like an earlier theoretical result using realistic growth models and physical parameters [Zhang et al., Phys. Rev. Lett. 73 (1994) 1829]. While the results of Zhang et al. showed the existence of the extended fractal growth regime only on triangular but not on square lattices, we find its existence on the square lattice. There is experimental evidence of this growth regime on a square lattice. The standard DLA model cannot characterize fractal morphology as the fractal dimension (Hausdorff dimension, DH) is insensitive to morphology. It also predicts DH = DP (the perimeter dimension). For the usual fractal structures, observed in growth experiments on surfaces, the perimeter dimension can differ significantly (DH $\neq$ DP) depending on the morphology. Our modified DLA model shows minor sensitivity to this difference.

Reference:- Aritra Ghosh, R. Batabyal, G.P.Das and B.N.Dev "An extended fractal growth regime in the diffusion limited aggregation including edge diffusion" AIP Advances 6, 015301 (2016). Work done at: Presidency University, Kolkata

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