Supporting information

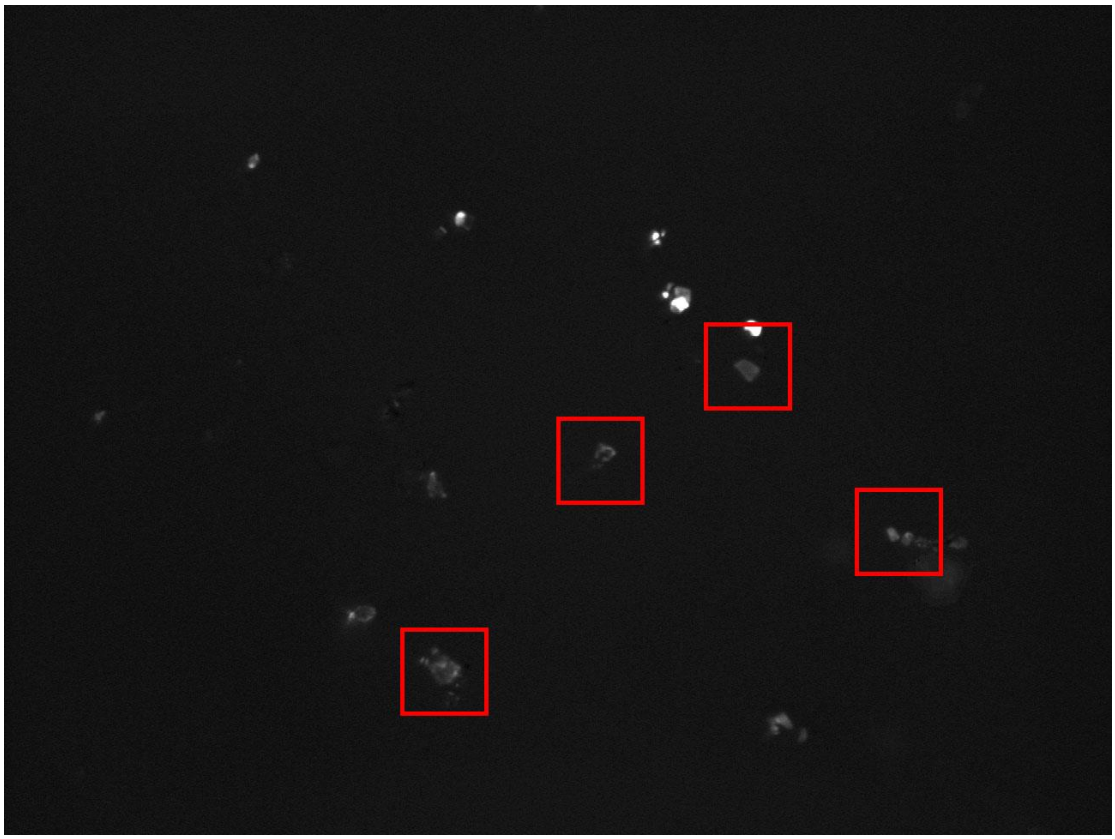

Figure S1. Coccolith counting in Fp-12 test (F. profunda in 70% glycerol centrifuged for 12 min): coccoliths marked by red squares are *F. profunda* and other particles are none-coccolith particles with similar or smaller sinking velocity as that of *F. profunda*. The exposure of this picture was enhanced 2 times in Photoshop because of the dim of *F. profunda*.

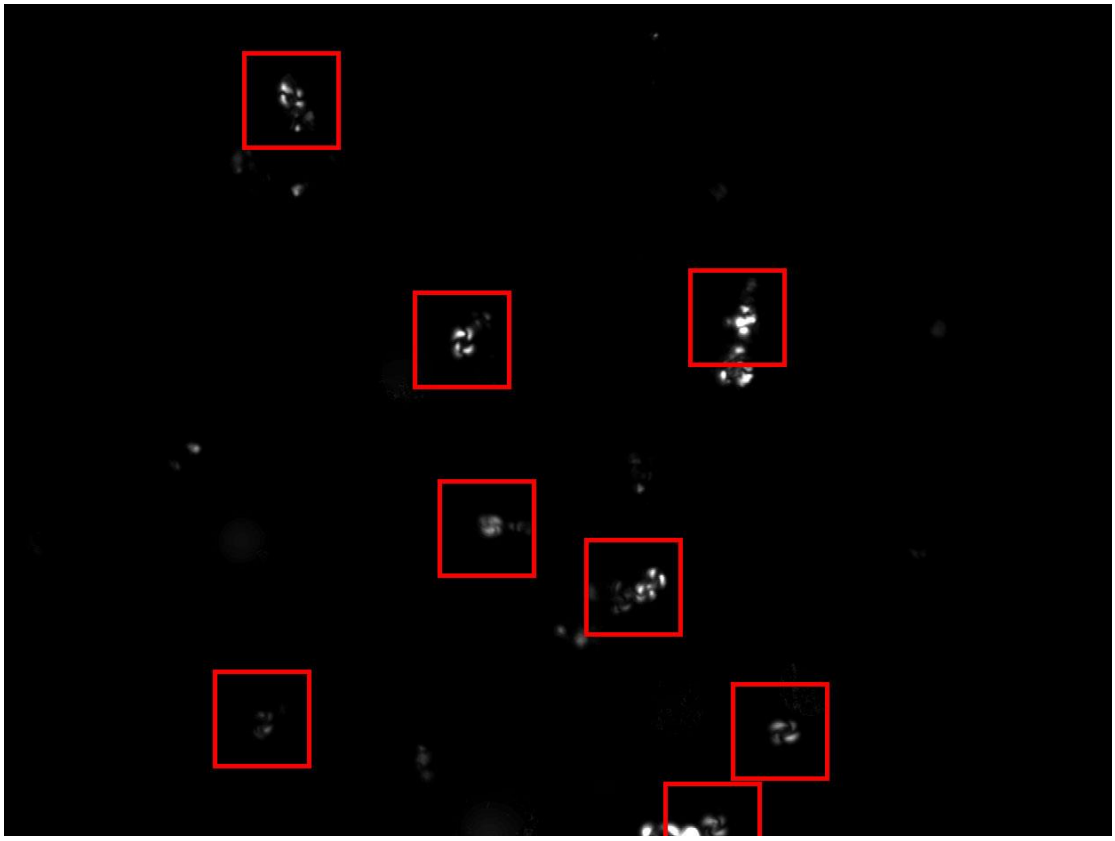

Figure S2. Coccolith counting in the G60-1min test (small *Gephyrocapsa* in 60% glycerol centrifuged for 1 min): coccoliths marked by red squares are *Gephyrocapsa* spp. and other particles are none-coccolith particles with similar or smaller sinking velocity as that of *Gephyrocapsa* spp.

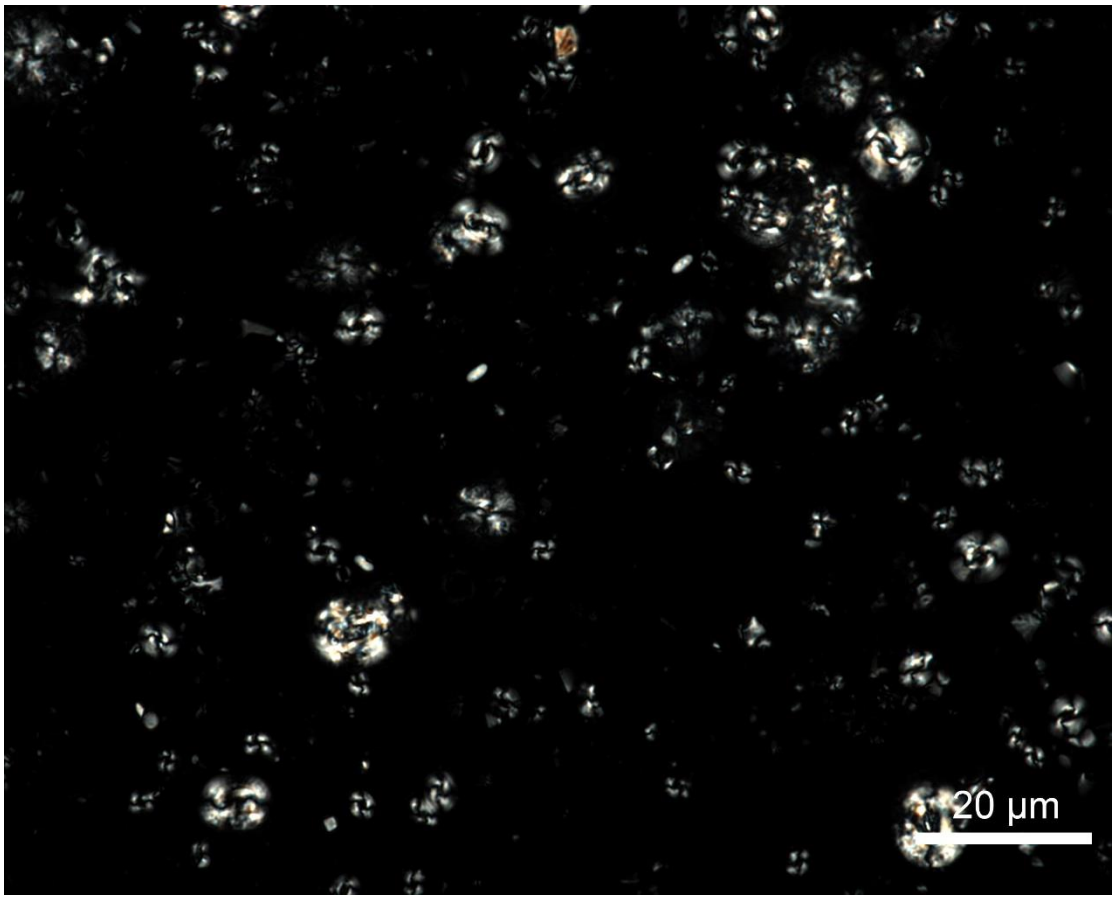

Figure S3. The raw sediment of ODP 982B 56X Section 5 5-9cm.

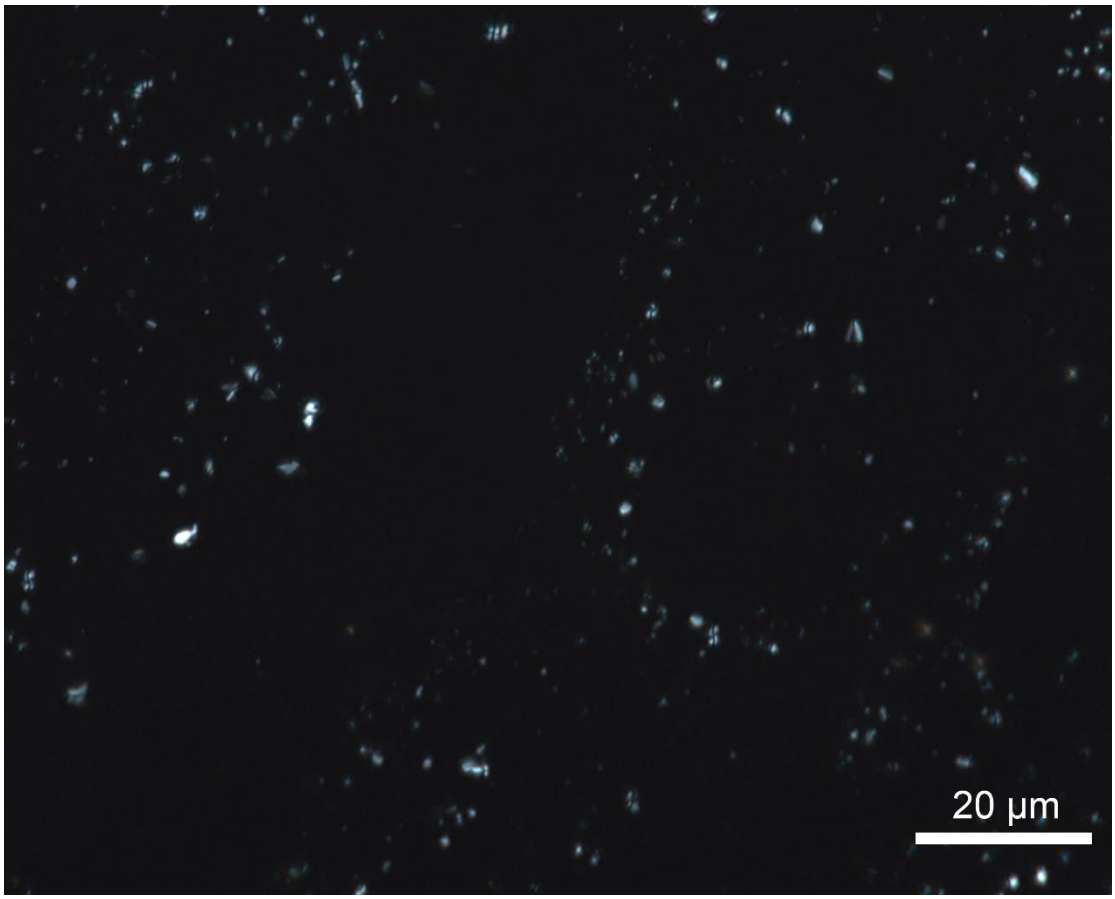

Figure S4. Particles harvested after centrifuging by 2250 rpm and 1 min. Most of particles in this size fraction are coccolith fragments and non-coccolith carbonate.

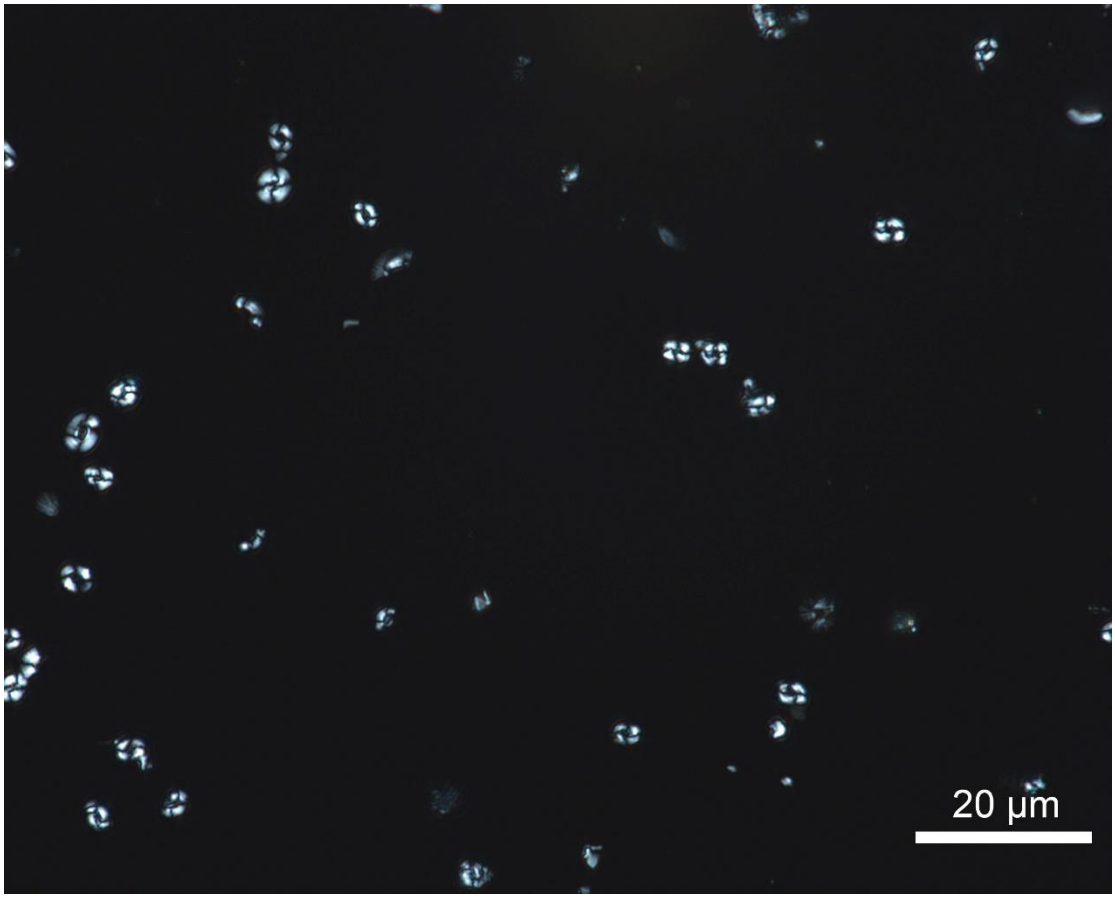

Figure S5. Particles harvested after centrifuging by 2250 rpm and 1 min.

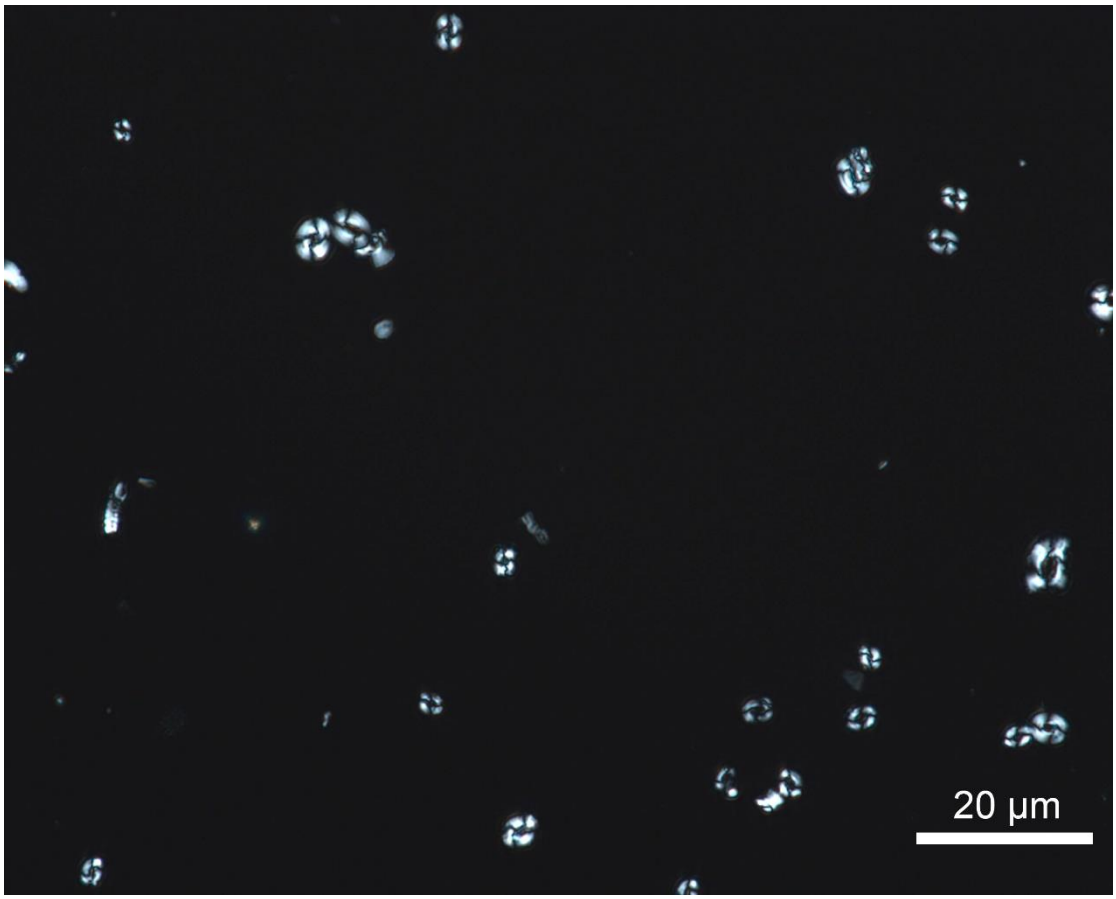

Figure S6. Particles harvested after centrifuging by 1400 rpm and 1min.

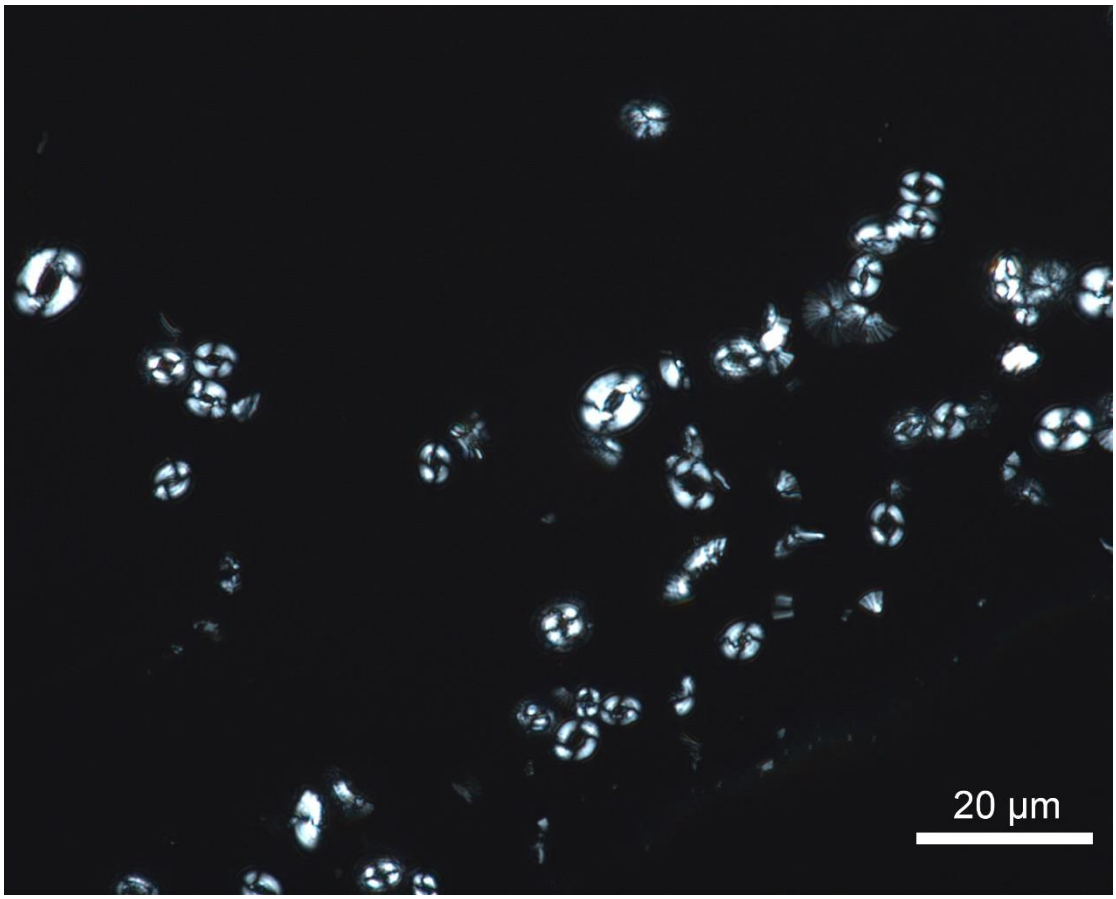

Figure S7. Particles harvested after centrifuging by 1000 rpm and 1min

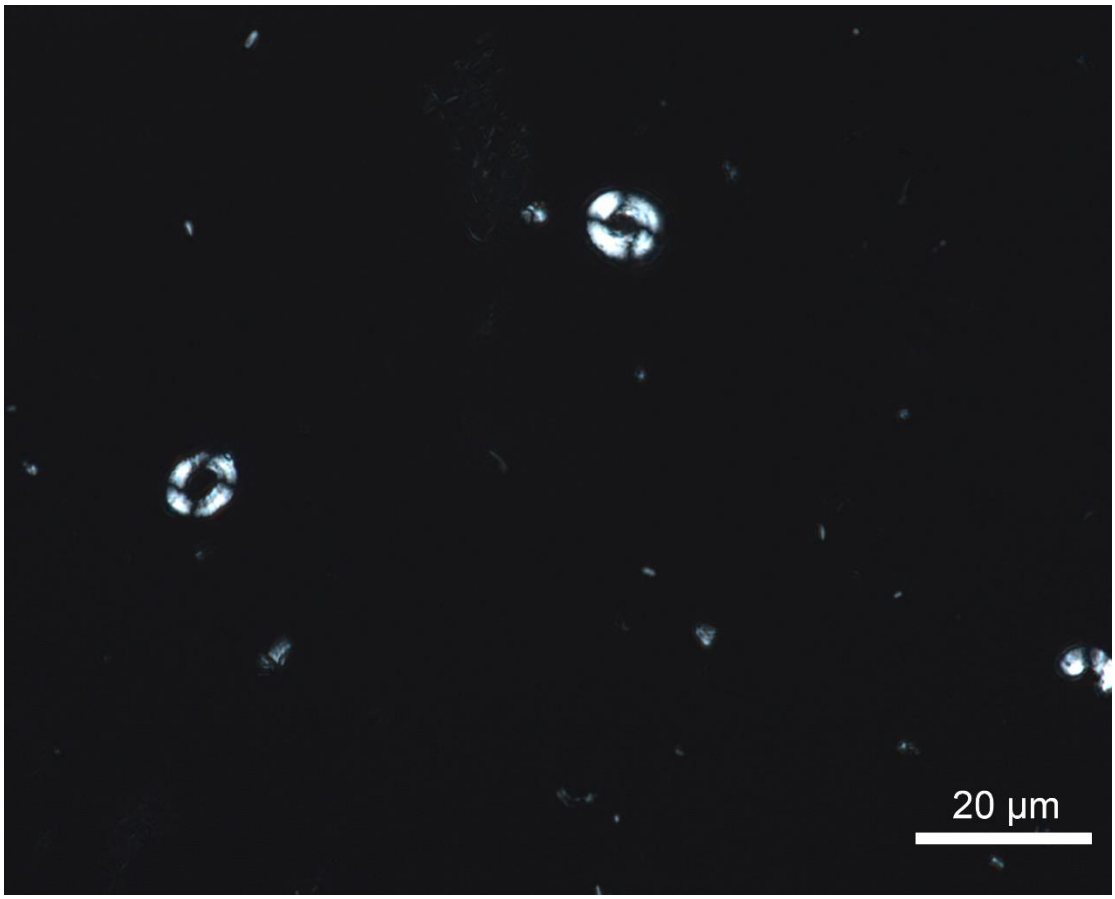

Figure S8. Particles harvested after centrifuging by 600 rpm 1min. The coccoliths in this step were dissolved because of lacking enough ammonia buffing after five steps of separation.

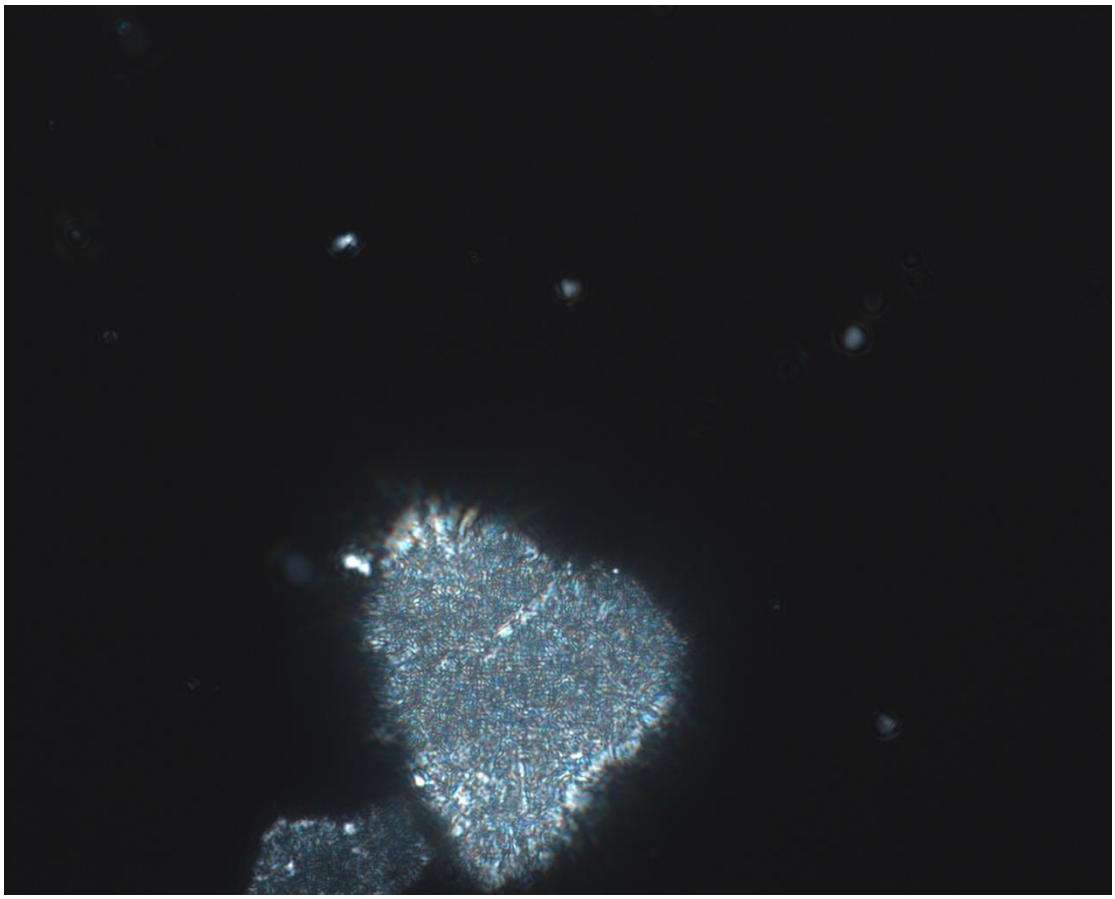

Figure S9. Particles left in the suspension after 5 steps separations. The biggest carbonate particle should be a fragment of foraminifera shell.