# The cohesive strength of neutron star surface matter and its implications for neutron star magnetosphere and thermal radiation

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Recent observations have failed to find any radio emission from magnetars. On the other hand, there exist radio pulsars with inferred magnetic field strengths comparable to those of magnetars. We propose that this difference could be explained using the standard polar gap model. This model requires that particles be tightly bound to the surface of the neutron star, so that a charge gap can form in the magnetosphere; if such a gap does not form the star will not emit coherent radio emission. We have investigated the conditions for the binding of particles to the surface and the formation of this polar gap. As part of the investigation we have calculated the cohesive energy of neutron star surfaces for a wide range of surface compositions and magnetic field strengths. Our investigation allow us to divide neutron stars into two classes, those with gap acceleration and those without. We suggest that magnetars fall into this second class. We have also investigated the conditions for the formation of a bare neutron star surface. Such a surface would have a noticeable effect on the thermal radiation from neutron stars.