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**Constructions and Bounds for Unconditionally Secure  
Commitment Schemes**

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**Abstract** commitment schemes have been extensively studied since they were introduced by Blum in 1982. Rivest recently showed how to construct unconditionally secure commitment schemes, assuming the existence of a trusted initializer. In this paper, we present a formal mathematical model for such schemes and analyze their *binding* and *concealing* properties. In particular, we show that such schemes cannot be perfectly *concealing*: there is necessarily a small probability that Alice can cheat Bob by committing to one value but later revealing a different value. We prove several bounds on Alice's cheating probability, and present constructions of schemes that achieve optimal cheating probabilities. We also show a close link between commitment schemes and the classical "affine resolvable designs."